GEORGIA
DEPARTMENT OF
NATURAL RESOURCES

ENHANCED
INSPECTION and MAINTENANCE
TEST EQUIPMENT
AND SOFTWARE SPECIFICATIONS

PHASE III

Version 4.4

September 28,2004

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Section 1 - General Specifications

1.00 Definitions

Terms and phrases defined in the Enhanced Inspection and Maintenance (I/M) Rules are adopted by reference.

Advisory Period: The time period prior to when mandatory OBD/ASM2 testing starts and when the software to perform the OBD/ASM2 tests is loaded on a GAS unit.

ASM TERMS:

$HPxxxx_{yy}$ = The ASM actual horsepower value contained in the look up table for a vehicle being tested (using the ASM 2525) on a dynamometer with yy inch diameter rollers. The actual horsepower is the sum of the indicated horsepower and the parasitic losses ($PLHP_{zz-yy}$).

$IHPxxxx_{yy}$ = the "indicated" ASM horsepower value set on the dynamometer.

THPxxxx = the "total" horsepower for an ASM test includes indicated, tire losses, and parasitic loses. This value is independent of roll size.

ETW = Equivalent Test Weight. Weight class of vehicle for testing, defined as curb weight plus 300 pounds. For ASM testing, it is rounded to the nearest 125-pound increment.

$GTRL_{@zz\ mph\ -\ yy}$ = Generic tire/roll interface horsepower losses at zz mph on a dynamometer with yy inch diameter rollers.

$PLHP_{zz-yy}$ = Parasitic losses (horsepower) due to internal dynamometer friction. A value is specific to each individual dynamometer and speed.

A_t = 1st curve coefficient used to characterize tire/roll losses. (Value depends on dyno roller diameter).

B_t = 2nd curve coefficient used to characterize tire/roll losses. (Value depends on dyno roller diameter).

C_t = 3rd curve coefficient used to characterize tire/roll losses. (Value depends on dyno roller diameter).

XXXX = Placeholder for ASM test mode, ASM 2525/ASM5015.

yy = Placeholder for dynamometer roll diameter. (In Georgia 8.6 inches).

zz = Placeholder for dynamometer speed. (In Georgia, 25 mph, or 15mph).

OBD II TERMS:

DLC = The DLC is the connector where diagnostic scan tools interface with the vehicle's on-board computer. Under OBD II the DLC is a standardized 16-cavity connector and has a standardized location. The DLC is found inside the vehicle in any of nine locations as

defined in Appendix L OBD Locator Grid

KOEO = Key On Engine Off, a specific state of the ignition key where power is applied to the on board computer and other circuits without allowing the engine to run.

KOER = Key On Engine Running, a state of the ignition key where the engine has been turned on and allowed to run. This test is not performed during the Georgia OBD test sequence.

MY = Model Year or production year of the vehicle as determined usually by the 10th digit of the VIN of the vehicle.

PCM = Powertrain Control Module, the main computer of the vehicle and the heart of the OBD system. The PCM monitors engine functions or both engine and transmission/transaxle functions.

PID = Powertrain Identification, a number returned by the OBD PCM that is make and model specific.

VID = Vehicle Identification Database, the database containing the Georgia Enhanced I/M test results.

VIN = Vehicle Identification Number, the number associated with each vehicle used to identify it. This number is usually located on the driver's side of the dashboard.

VIR =: Vehicle Inspection Report, the report given to the motorist indicating the results of the test just performed on the vehicle tested.

1.01 General Information

(1) The State of Georgia implemented an enhanced inspection/maintenance (I/M) program on October 1, 1996. The primary goals of the Georgia Enhanced I/M Program are:

(a) To produce a significant reduction in the automotive emissions which contribute heavily to Atlanta's ozone air quality problem,

(b) To provide maximum consumer convenience by allowing a large number of stations to perform testing; and

(c) To preserve business opportunities for local businesses.

(2) To accomplish these goals, the Georgia Enhanced I/M Program is fully decentralized and utilizes relatively ASM test equipment to facilitate small business participation. The basic features of the program are:

(a) Testing by decentralized facilities, with no distinction between test-only and test-and-repair locations.

(b) A hybrid of test types – for all vehicles covered by the Rules of Georgia Department of Natural Resources Environmental Division Chapter 391-3-20 Enhanced Inspection and Maintenance, an Acceleration Simulation Mode (ASM2525 and ASM 5015 or ASM2) test for older vehicles - those older than 1996, a two-speed idle (TSI) test for vehicles, that can not be tested using ASM testing sequences, and an On Board Diagnostic (OBD) test

for MY 1996 and newer vehicles. A tampering inspection for catalytic converters is required on older vehicles. A fuel cap-only check for evaporative emissions is also required for all covered vehicles.

(c) Commencing May 1, 2002, vehicles older than the 1996 model year can only be tested at inspection stations equipped and certified to perform the ASM test procedure.

(d) Phase III requires the analyzer portion of GAS to perform an OBD test. The software may also include other changes that the Environmental Protection Division (EPD) determines are necessary to improve the program. EPD expects any such changes to be minimal.

(e) The number of vehicles covered by the program is nearly 2.2 million. The program boundaries include thirteen counties, which cover the entire ozone non-attainment area. All 25 year old and newer model year vehicles will be inspected that are 8500 GVWR or less and are fueled by gasoline.

(f) Testing will be performed on a schedule defined in the Rules for the Enhanced I/M Program O.C.G.A. 391-20.

(3) This document describes the test equipment to be used, the test sequences, software requirements, quality control procedures, and other features of the program. This document is based substantially on the Georgia Phase II Specification documentation.

(4) The Phase III document incorporates additional features needed to implement ASM2 testing and OBD testing. It also includes miscellaneous changes that the State has determined are needed based on the operation of the program in Phases I, and Phase II. A listing of the specific changes in the Phase III document can be found in Section 1.02, Changes from the Final Phase II Document.

(5) This document shows additions or changes by underlining the text involved. Deleted text is shown by using the strike-through method.

1.02 Changes from the Final Phase II Document

(1) This document contains changes needed to implement Phase III of the Georgia program. These are primarily changes needed to implement ASM2 testing for vehicles older than the 1996 model year and OBD on 1996 and newer vehicles. There are changes related to the data system specification and collection. Minor changes have also been made to the existing software specification to implement changes that the State has determined are needed to improve the operation of the program, based on experience from the implementation of Phases I and Phase II.

(2) Finally, the Phase III document has been reorganized in an attempt to improve the readability of the specification. This has been done primarily by consolidating and renumbering related topics such as software requirements into one section of the document.

(3) Specific changes and additions include:

1. Addition of test prompts and logic for the ASM2 and OBD II portions of the test including revised VIRs for the motorist,
2. Revisions to miscellaneous data records to reflect the ASM2 test, the OBD test, and

other changes (Appendix C)
3. Adding provisions to determine whether an OBD, ASM or TSI test will be performed
4. Added provisions for retesting a fuel cap and test a second fuel cap.

1.03 High Throughput Testing Capability

The emission analyzer shall be designed so that it is capable of testing at least six vehicles per hour without experiencing excessive hang-up or other deleterious effects. A study shall be submitted to the EPD indicating the maximum number of tests per hour that were achieved using the analyzer submitted for certification. A brief description of the study methodology used by the manufacturer to make the throughput determination shall be included in the study. This evaluation shall not include the time required to enter vehicle identification data.

1.04 Manufacturer's Assurance

The manufacturer shall certify to the EPD that the exhaust emission analyzer meets or exceeds the performance specifications of this document.

1.05 Applicable Codes

(1) The manufacturer shall certify that the GAS submitted for certification complies with all applicable Georgia and Federal administrative, safety, ergonomic, licensing, and certification requirements.

(2) Manufacturers shall utilize a testing laboratory or laboratories approved by the State. Representation by the management contractor during the certification process is mandatory. Manufacturers may propose to use in-house facilities to perform portions of the certification for which they have capabilities. Approval for in-house testing must be obtained prior to commencement of any such testing. The Certification requirements are established in Appendix B. The manufacturers shall supply the State with the following specific information before submitting their application for certification:

(a) Certification Laboratory
1. Description of the laboratory's capabilities, including the type of testing commonly performed there,
2. Description of the laboratory's facilities, including size, location, and specialized facilities, such as EMI rooms,
3. Description of the laboratory's test instrumentation, including manufacturer, model number, accuracy, and frequency of calibration;
4. Description of the laboratory's testing and follow-up procedures.

(b) Functional Testing Laboratory: In addition to the requirements of 1.a, b, and c, above, the following information must be provided:

1. Credentials of the staff that will be performing the tests at the selected laboratory;
2. A statement from the person in charge of testing at the lab and the manufacturer's representative witnessing the tests, certifying that all tests were performed and that they were performed in the manner required in the specifications; and
3. A description (i.e., brand names, model numbers and list of specifications) of the equipment used to perform the tests contained in the Appendix B specifications.

(c) Approved Testing Laboratories
The following companies are approved. Manufacturers may propose other qualified companies.

- Sierra Research
- TESTCOM, Inc.
- Radian Corporation/ de la Torre Klausmeier Consulting

1.06 Tamper Resistance

(1) HARDWARE – PC: Controlled access design shall be the responsibility of the manufacturer and is subject to approval by the State. Manufacturers shall utilize special BIOS partitions (or equivalent approved by the State), as well as other appropriate software and hardware provisions deemed necessary by the State to protect the I/M files and programs. File and program protection may consist of mechanical systems in combination with electronic/software systems. The protection features shall prevent access to the secured floppy disk drive and portions of the hard disk containing I/M programs and test data. The "control" key, or its functional equivalent giving access to the OS, shall not be activated except by a special password and a "blind" entry on the QA/State Representatives menu *or Service Menu*. The password shall be chosen by the State at the time of certification testing. Other security or protection alternatives, including more sophisticated BIOS limitations, may be proposed by the analyzer manufacturer for approval by the State.

(2) HARDWARE – Cabinet: At a minimum, the manufacturer shall develop tamper-resistant features to prevent unauthorized access through the cabinet. Microswitches, keyed locks, software-controlled locks, and software algorithms requiring the use of an access code shall all be utilized where appropriate. Access codes for State/QA function must be changed on a daily basis based on an algorithm provided by the State. Service access codes must be changed on a daily basis based on a unique algorithm provided by the manufacturer.

(a) Manufacturer may utilize a combination type lock on the door securing the floppy disk drives as long as the locks are built-in, good quality, and authorized personnel can easily change the combination when a security problem is identified. The following examples illustrate ineffective - and therefore unacceptable - security measures: A mercury switch would not be effective if the analyzer can be tipped over to one side to trigger the switch. A keyed lock would not be effective if it is placed in a position that allows the analyzer cabinet to be flexed slightly to bypass the lock.

(b) A solenoid lock may be used instead of, or in addition to, any key or combination lock that may be provided. All GAS units, existing or future, shall have sensors, such as microswitches, to detect the open/closed state of the doors, as well as other secured areas of the GAS. The GAS shall monitor these sensors, and shall define an inappropriate state as a tamper (e.g., a tamper switch that always indicates that the floppy disk door is closed).

(c) The use of micro-switches to detect unauthorized entry is acceptable. However, unauthorized access to the secured areas of the analyzer shall be detected even when the power is off. The analyzer shall record the type and location of each tamper. The tamper attempts shall be recorded in a tamper file that includes the date of the tamper-caused lockout, the type and location of the lockout, the date the lockout was cleared, and who cleared the tamper (State/QA or manufacturer's

service representative). The specific tamper type and location shall be accessible through the QA/STATE MENU- "LOCKOUT GAS" option or service screen.

(d) If tampering occurs, a software lockout algorithm shall be activated which aborts any existing test sequence and prevents further I/M testing until the lockout is cleared by a State field representative or other authorized representative. Software obtained independently by the inspector shall not be bootable from the optional floppy disk. In addition, manufacturers must describe, to the State's satisfaction, what security measures will be taken to prevent the unauthorized use of access codes, keys, and combinations to the secured areas of the analyzer under each of the following circumstances:

1. Tampering has occurred.
2. A manufacturer's service technician quits or is fired
3. A combination, key, or critical access code is obtained by an unauthorized person(s) such as a Georgia Emission Test inspector.

(3) HARDWARE: Sample System: In addition, the emission analyzer and the sampling system shall be made tamper-resistant to the State's satisfaction.

(4) SOFTWARE: At no point shall inspectors have access to either the OS or the BIOS.

(b) Analyzer operators shall be prohibited from creating or changing any test results, EPD programs or EPD data files contained in the GAS. Access to the OS shall not be available to the manufacturer's service technicians except as provided for in item 6 of this section.

(c) Access codes used by the service representatives shall be changed automatically by the GAS on a daily basis. The formula must not be available to field service personnel. The daily service access codes may only be given to authorized field service representatives, and may not be provided more than one week in advance.

(5) LOCKOUT: The lockout system shall be designed so that it can be activated by a management contractor field representative from the State menu. Only management contractor field representatives, or other representatives with specific written authorization from the State, may remove lockouts put in place from the QA/State Representative Menu. Manufacturers shall develop a system by which their service technicians shall be prevented, by some method approved by the State, from clearing State installed lockouts.

(a) In particular, the following policies shall apply to the manufacturers' field representatives:

1. They shall not be capable of:
   a. Clearing a State/QA-installed lockout, or
   b. Clearing a lockout due to a requirement for a three-day GAS calibration/leak check.
2. They shall not add, delete, or modify the Inspector Number except in cases in which a complete crash of the hard disk and/or floppy disk prevents the transfer of information to and from the affected GAS unit. Field service representatives may enter station numbers and GAS ID numbers.
3. If the test record or calibration records are lost due to a crash of the hard disk and/or floppy disk they shall notify the EPD prior to leaving the location that the information is lost, the cause, and what repairs were made to correct the

problem.

4. They shall not be capable of altering the calibration gas values to any values other than those approved by the State.
5. They shall not clear a lockout when there is evidence of physical tampering. Furthermore, they shall report this or any other type of lockout to a management contractor auditor by the end of the working day of discovering the lockout.
6. They shall not have access to OS except as needed to install EPD-approved software updates or to provide required service.

(6) OPTIONAL PACKAGES: Manufacturers may offer analyzers with additional floppy and/or hard disk drives that can run optional software application programs.

(a) Optional software packages supplied by the manufacturer shall not interfere with the normal operation of the I/M inspection and testing software. Optional packages shall not compromise the tamper-resistance of the analyzer (such as give the inspector access to the OS), must be certified by the manufacturer to not interfere in any way with the operation of the State test program, or cause any violation of the State rules.

(b) Access to and from all required and mandatory-option programs shall be "seamless". These programs shall be accessed from the Main Menu or a submenu from which they were accessed, without requiring the GAS to reboot.

1.07 Microcomputer Specifications

(1) A standard microcomputer must be included in the analyzer and is to be used to control all analyzer functions. Each vendor is required to develop the required executable programs for all required functions. The specifications detailed in this section are to be considered a minimum requirement. Vendors are suggested to evaluate current technology offerings with respect to industry levels of support (in the long term) for both hardware and operating systems. These programs shall:

(a) Control the specified analyzer functions and timing of functions.

(b) Examine and obtain data from all of the analyzer sensors and fuel cap tester.

(c)Read and write information to a diskette in standard DOS format.

(d) Copy the analyzer and inspection station identification information from the hard disk onto each new floppy diskette when formatted

(e) Allow access to all Georgia Program Administration functions and be capable of performing these functions via modem through the VID such as

- -Tampering, lock-out checks
- -Responses to queries
- -Report downloading

(f) Broadcast any site-specific messages, etc.

(2) Georgia EPD reserves the right to add additional programs and functional performance requirements, up to the technical limits of the hardware and software to improve the I/M program.

(3) Sufficient flexibility shall be provided in the design of the microprocessor system to allow expansion of the analyzer to include but not limited to the following additional capabilities:

(a) Connect and retrieve data from vehicle on-board diagnostic systems (OBD) meeting EPA/SAE specifications when they become available
(b) Monitor vehicle recall data: identify, record, and process data as required when an official EPA/SAE format is defined
(c) Accommodate additional input channels in both analog and digital form. At least one free ISA slot and/or one free PCI slot shall be provided.
(d) Accommodate additional data of vehicle information and test results
(e) Future revisions for emissions repair monitoring and reporting

(4) All equipment and software submitted for certification must be full and current configuration proposed for sale. Partial, dated or incomplete configurations are not acceptable. All upgraded equipment shall contain complete software, hardware, and program documentation.

(5) The proposed hardware configuration must be fully supported by all software and/or operating systems listed in the acceptance requirements elsewhere in these specifications. Performance tests to prove compatibility will be conducted. The vendor will bear all shipping and equipment preparation charges for the certification testing.

(6) Standard Hardware: Minimum Required

(a) Operating System
The latest production version available of DOS, Windows XX, Macintosh, or OS2 with safeguards to limit access to OS. The software program will neither exit to OS, provide a "shell to OS", nor be bootable from any unsecured floppy, nor from a CD. The vendor shall disable the option to boot from any unsecured floppy disk drive.

(b) Processor: The microprocessor must be upgradeable to be fully compatible with the Intel Pentium microprocessor or better

(c) RAM Memory: The system must contain a minimum of 2 MB of user available RAM.

(d) Power up Sequence: The system must include a power up sequence that provides a self-diagnostic routine to check the on-line presence of critical PC components, including at a minimum:

- The processor
- Firmware ROM
- Hard disk controller
- Keyboard
- Clock
- Modem
- Printer(s)
- Bar code reader I/O ports
- Set RAM and memory

(e) Video: The video display must be at least a 14" diagonal screen with dot pitch of no more than .28 mm. The display shall be driven with a color graphics adapter with a minimum of 1 MB on-board memory (upgradeable) and capable of displaying, at a minimum, 256 simultaneous colors at 640x480 resolution. The display should be energy star compliant.

(f) Floppy Disk: Each unit must come with an IBM compatible floppy disk drive that will permit full usage of 2sHD 1.44 MB 3.5" removable media. The drive must be located in a secured area accessible only to Georgia Program officials and authorized service representatives. That secured drive must also include an approved method to limit logical access. The Program Administration will test the system for drive security. It shall not provide access to the secured floppy except through the approved security procedure. The secured floppy drive shall be designated the "A" drive. The PC BIOS should accommodate disabling the ability of booting from a floppy or a CD ROM drive.

(g) Hard Disk: Each unit must have at least one standard IDE or SCSII hard disk controller and a minimum hard disk size of one GB (non compressed). The vendor must ensure that a minimum of 400MB of storage is available for the Georgia Program data and user information. The hard disk is to be self-parking (where applicable), shock mounted, and able to operate reliably in the inspection environment. The hard disk must also include a Georgia Program Administration approved method of limiting access to data and programs. The hard disk containing programs and data files shall be designated the "C" drive.

(h) Input/Output (I/O) Ports: The unit must include sufficient I/O ports of proper configuration to allow the connection of all required options and the capability to add additional I/O boards. The unit must include at least one MS-DOS/IBM PC standard compatible parallel printer port.

(i) Keyboard: The analyzer keyboard must be fully interfaced with the microcomputer and have all of the necessary, normal, numeric, cursor, control, shift, alternate, and function keys needed to operate the microcomputer, with a minimum of 101 keys should be provided. The keyboard shall be able to interface and fully operate the analyzer. The analyzer's keyboard shall be interchangeable with a locally purchased, off-the-shelf keyboard.

(j) Bar Code Scanner: The purchase of a bar code scanner for reading Vehicle Identification Numbers directly from the vehicle or from the vehicle’s registration document may be required later. Configuration of the analyzer should allow for installation of the bar code scanner. The bar code scanner must be able to read a bar code through a windshield, even if the bar code is 6 to 8 inches from the windshield. The bar code scanner shall use visible laser diode technology, be able to with stand multiple drops to concrete covering a distance of at least a 4 feet, and be environmentally sealed to withstand the normal operating conditions of an automotive testing/repair environment.

(k) Hard Disk Expansion: Each system must include a hard disk interface that will fully support a second internal disk drive of the same type as the original type drive or a functional equivalent approved by the Georgia Program Administration. Tamper-resistance shall not be compromised by the use of the second disk drive and/or the hard disk interface. The vendor shall ensure that there is adequate space and brackets to accommodate the addition of the second hard drive.

(l) Additional Storage: 3.5" 1.44 Mb Floppy Disk Drive, IBM Optical disk drive, CD ROM reader etc., -These options would be for manufacturer offered look up tables, service information or other options requiring additional storage capability.

(m) Communications: Each system must include a Hayes command set compatible, CCITT v.34 modem with Microcom networking protocol (MNP) level 5. Error

correction: data compression: M.P. level 5 and v.32bis/v.42bis. Protocol shall be provided within the operational software package. Modem communications will be necessary during the inspection process for VIN matching, multiple "I" Test Control, vehicle recall etc., from the Network System Host Computer. The minimum acceptable modem baud rate is 14,400. In order to minimize VID connect time, EPD recommends a minimum baud rate of 28,800. The modem shall communicate to the VID at the maximum reliable speed allowed by the VID.

(n) The analyzer shall be programmed to automatically lock-out, if a software program update does not load properly via the diskette or by remote access.

(o) Clock/Calendar

1. The analyzer shall be equipped with an internal clock that operates independently from the power source and will provide accurate and automatic date and time information for the following functions:

    - Each test performed
    - Automatic gas calibration and pressure test check (as defined)
    - Automatic leak check (as defined)
    - Audit sequence
    - Dynamometer calibration where applicable

2. The real time clock/calendar shall make available the current date and time. Dates will be in month, day, year format and time will be in a 24-hour format. The Program system host computer shall update both time and date during each transfer of data at the beginning of a test (i.e., at certificate or VIN/license entry) via the system modem.

3. If the clock/calendar fails or becomes unstable (as referenced to the program host system during modem data transfer), the analyzer unit shall be locked out from I/M testing and a message shall be displayed indicating that service is required. Any other clocks installed by the manufacturer shall be synchronized with the VID clock.

4. The date/time, along with the test start and end times is to be included on the test record. The start time is when the inspector's access code is entered and the end time is when the analyzer data is written to the test file.

1.08 Directory and File Structure

(1) The hard disk designated as "C:" will have the following subdirectories existing off the root directory:

C:\DOS
C:\GASDATA
C:\COMM
C:\MAILIN

(2) The manufacturer may name directories for use of the GAS software but must provide the above directories for state administration use. The computer path must include

C:\
C:\DOS

In addition, the path should also contain the directory from which the manufacturer's GAS software will run.

(3) Some of the files used in the system are required by the state to be stored in two distinct media locations for redundancy purposes. Three acceptable methods of performing this are:

(a) At the time of storing the information, files denoted as requiring redundancy are written to the floppy drive (A:) of the GAS unit directly after the data has been written first to the hard disk(C).
(b) At the time of storing the information, files denoted as requiring redundancy are written to a second hard disk (D:) or other partition of hard drive of the GAS unit directly after the data has been written to the first hard disk (C:).
(c) Any other media accepted by the state administration

(4) Below is a list of files to be contained within the C:\GASDATA directory along with their redundancy requirements:

FILES	STATE REDUNDANCY REQUIRED
GAS.DAT	YES
GAS.HST	NO
CAL.DAT	YES
TAMPER.DAT	YES
VIDCOMM.DAT	NO
INVENTRY.DAT	YES
TOKEN.REC	NO
STATION.DAT	YES
TECH.DAT	YES
CERTNUM.DAT	NO
FEE.DAT	YES

(a) At the conclusion of each test or gas calibration, the test or calibration record (including aborted tests) shall be placed in the appropriate file indicated below:

1. "GAS.DAT" This file will contain test records, from the start of any test, which have not been collected by the state. The software must also test for the existence of the file before writing to the file (on both media where the file is maintained). If the file does not exist then the GAS shall create it.

2. "GAS.HST" This file will contain archived test records that have been collected by the state. This file will have the "GAS.DAT" file appended each time "GAS.DAT" is collected by modem.

3. "CAL.DAT" This file shall contain gas calibration results. The manufacturer will be responsible for populating field 56 of CAL.DAT, NO cell number. This field is to be updated by the manufacturer's technician each time the NO cell is changed. Field 57 is no longer to contain the serial. Field 3 will contain the program software version number. The software must test for the existence of the file before writing to the file. If the file does not exist then the GAS shall create it.

4. "TAMPER.DAT" This ASCII file shall store the current lockout and tamper status of the GAS unit. Status of the all tamper/ lockout areas shall be stored in the file and displayed

as "Clear" or "Locked - MMDDYYYY". If the status area shows "locked", the date shall follow the locked condition. See Section 4.02 for a list of the lockouts used in TAMPER.DAT file.

This file shall be displayed, and tamper/locks shall be cleared, from the "QA/STATE" menu "LOCKOUT GAS" function or through the VID.

(5) Duplication of Files on the State A:\Drive

(a) In order to limit GAS down-time after serious hard disk malfunctions which may require a new or reformatted hard disk, the manufacturer shall store duplicate files on the state A: floppy disk drive. The files to be duplicated are:

- TECH.DAT
- CAL.DAT
- TAMPER.DAT
- FEE.DAT
- STATION.DAT
- GAS.DAT,
- INVENTRY.DAT

(6) Each time the files are modified, the changes must be written to both the file contained on the hard disk as well as the floppy. This will mean less down-time for the station in restoring access codes and station information. The GAS must write these files to the floppy after state personnel, the QA inspector, or a service representative makes a disk change.

1.09 Required Printer

The printer must be sufficiently rugged to operate in the diverse operating conditions at the station. A minimum print speed of 240 cps is required (draft mode). The analyzer's printer shall be interchangeable with a locally purchased, off-the-shelf, compatible printer and be attached to the parallel port using a standard parallel cable. Each equipment supplier shall maintain an updated list of compatible printers with EPD and the management contractor. Printer drivers for the approved printers shall be made available to the operator.

1.10 Capability To Access OBD Fault Codes

Analyzer manufacturers will be required to develop provisions for reading fault codes contained in vehicle on-board computer systems using the SAE Standardized Link for 1996 and newer vehicles so equipped, for the Phase III program. The OBD reading capability is required by the start of Phase III. The GAS shall prompt the inspector to access the vehicle's OBD port, decode the fault codes and display the results on the screen, print a short description (see Appendix M) of the codes on the VIR and record the fault codes on the test record. EPD intends this check to become the pass/fail criteria in lieu of a tailpipe emission test.

The RS232 port for the "SAE Link" shall meet the requirements of SAE J1962.

1.11 Vehicle Reference Table

(1) The Vehicle Reference Table will be supplied by EPD or other authorized agent on a disk in ASCII format. This table provides emissions application and test sequence selection information to help the mechanic perform the inspection/test more accurately. The format and field lengths of the table will be sent separately.

(2) Manufacturers are required to integrate the information from the table into the analyzer software so that emission standards and testing parameters are properly utilized (in accordance with the specifications) during inspection process.

(3) Up to five megabytes total information shall be provided to accommodate the reference table. A procedure has been added to allow periodic partial updates of the VRT through the VID or full updates through a floppy disk from the QA/State menu or Service Menu (Item 10)

(4) The GAS will send the VRT version date to the VID on every communication transaction as part of the security login, with the exception of diagnostic transactions. The VID will compare the transmitted VRT version date on the GAS to the current version date of the VRT on the VID. If they do not match, the VID will prepare a differential update to be sent to the GAS at a subsequent transaction. The differential update shall consist of each VRT Row that has been revised since the date of the VRT version transmitted. At the next transaction, the VRT shall be updated on the GAS before any emission test occurs. The GAS unit will update the VRT Table or Default VRT Table by replacing any affected row (as identified by its VRT Row Number) in the GAS unit's VRT with the row contained in the update. If a row number in the update is not already in the VRT, the VRT row from the update will be added to the GAS unit VRT. After the update, the VRT version date on the GAS shall be changed to the version date as transmitted from the VID. The GAS unit shall also allow the upload of a complete VRT table from a floppy disk through the QA/State menu or Service Menu. EPD will provide complete VRT disks to the management contractor after each annual update revision of the VRT and will allow equipment manufacturer's field service representatives to perform VRT updates.

1.12 Upgrades

(1) Analyzer manufacturers will be required to establish an upgrade path for the Phase III and later Georgia program. The Phase III upgrade will include all hardware and software needed to implement ASM2 testing for vehicles older than my 1996 and OBD testing for vehicles my 1996 and newer. This will include the test software needed to perform the ASM2 and OBD tests and collect required test data as described in this document. Manufacturers may include other equipment in the ASM2 upgrade package. In addition to the ASM2/OBD upgrade, all stations will be required to implement a software upgrade to allow any changes EPD determines are necessary to effectively implement its enhanced I/M program. Because of the short time available to manufacturers to produce GAS software and the need to make minimal changes to the existing GAS specifications, the Phase III upgrade may also include changes in the test sequence, prompts and data collection which were not feasible for Phase II. However, EPD expects these changes will be minimal.

(2) Because the general changes to the program software will be required for all analyzers after original purchase, these changes must be included in the purchase price of the analyzer.

(3) EPD will not include a specific requirement for annual or other periodic upgrades. EPD intends to include a requirement for bar code scanning of vehicle registration documents

when bar coding is implemented by the Georgia Department of Revenue. EPD expects to use the procedures specified in the BAR90 ET document for bar code entry of vehicle data.

1.13 Bar Code Readers

Manufacturers may be required at a later date to include a provision for reading calibration GAS values, inspector access codes, and VINs from the vehicle's registration document and from vehicle bar codes in addition to manual entry to allow entry of vehicle data by test stations.

1.14 Training Function

The analyzer shall contain a feature that will allow an inspector to perform the complete inspection procedure without generating a certificate or an official inspection record. The manufacturers will use this capability for training new purchasers of analyzers or by analyzer owners to train new employees. The training application shall not require the use of an inspector's access code or allow access to secured areas of hardware of software. The display shall show a message throughout the inspection that this is a training exercise and not a test for certification. Vehicle inspection reports shall indicate to the satisfaction of the State that they are for training only and cannot be used for certification.

1.15 State/QA Representative Access To Test/Calibration Records

There shall be a menu item on the QA/State Representative Menu that allows a record search to be performed. The search shall locate, display, and printout test and calibration records based on vehicle license number, VIN, date/time or certificate number information entered by a state representative. Once a test record is located, the QA/State Representative shall be allowed to review the previous test records as well as those that follow the target record.

Note: See Section 3.01, Menus - Main 6- QA/State Menu.

1.16 Lockout Notification

The analyzer shall alert the Operator of any lockout situation by prominently displaying a message on the CRT.

The GAS shall be prohibited from performing a Georgia Emission Test for any of the following reasons:

- Warm up in progress
- Warm up failure
- GAS calibration required
- GAS calibration failure
- GAS analyzer failure
- Dynamometer calibration required (ASM only) (see Note 4)
- Dynamometer calibration failure (ASM only) (see Note 4)
- Dynamometer failure (ASM only) (see Note 4)

- Fuel cap tester communications failure
- Fuel cap tester calibration required
- Fuel cap tester fails calibration check
- Leak check required
- Leak check failure
- GAS tampering
- Out of certificates
- Floppy disk is full
- Hard disk is full
- Floppy disk or disk mechanism failure
- Hard disk or disk mechanism failure
- Real-time clock failure
- QA/State GAS lockout(s)
- Analyzer initialization data missing, incorrect, or incomplete
- Exceeded the No-Transmit Count Limit (see note 1)
- Exceeded the No-Transmit Hour Limit (see note 2)
- Station license has been suspended, revoked or is expired (see note 3)
-
- OBD hardware failure (see Note 5)

Notes: 1. This lockout shall be set whenever fifty (50 = default) (The VID shall set the "NO TRANSMIT Count LIMIT".) Georgia Emission Tests (running total) have been performed without transmission to the network. The GAS shall maintain a count of how many test records have not been transmitted to the VID. This count shall be reset at the successful transmitting of records to the VID. This lockout, once set by the GAS (counter > 50), shall be reset automatically by the GAS after all records have been transmitted to the VID by performing a DATA FILE REFRESH.

2. This lockout shall be set by the GAS whenever the oldest stored test record (i.e., not transmitted to the VID) on the GAS has been stored longer than 168 hours (168 hours = default). The number of No Contact hours shall be determined by calculating the difference between the current time and the completion time associated with the oldest test record stored on the GAS. The current time shall be determined at the start of each official Georgia Enhanced I/M inspection at the time the inspector inputs his/her access code. If there are no stored test records on the GAS (i.e., all test records have been successfully transmitted to the VID), the GAS shall not conduct this elapsed time check. The elapsed time check is conducted only when a test has been completed and the record is stored on the Gas pending transmission to the VID.

3. Lockout(s) are established by the VID and the lockout status shall be updateable through communication to the VID by performing a "Lockout Status Request" from the GAS.

4. Dynamometer hardware failure shall not prohibit TSI or OBD testing.

5. OBD hardware failure shall not prohibit older vehicle testing.

1.17 Manual Testing Mode

(1) The GAS shall be capable of being switched to an operations mode that will allow the unit to be used as an ordinary garage emission analyzer for general automotive repair work and diagnostics. The GAS shall have the ability to view OBD II data in this mode.

(2) The GAS shall not be able to be switched to the diagnostic mode while an official test is in progress.

1.18 Software Loading

The inspector shall not have to load the microcomputer's operating or applications software to operate the GAS. On each POWER ON of the GAS, the GAS shall automatically do all microcomputer component self-diagnostics, memory checking, and loading of all necessary operating software without inspector intervention. Upon satisfactory computer component check out, the applications software is to present a menu of available GAS operations. All offered features are to be menu-driven. For each feature, a context sensitive, on-line help facility is to be provided which can be accessed preferably with single keystroke.

1.19 Documentation

(1) The analyzer software shall be fully documented. One copy of the documentation listed below shall be submitted to EPD unless otherwise requested. Manufacturers shall agree, in writing (signed by the CEO of the company), to submit copies of the program listings to EPD upon request, within a time frame satisfactory to the management contractor, or whenever a decision is made by the manufacturer to voluntarily suspend or terminate production of the GAS. EPD does not expect to ever have a need to review the items a. to f. listed below and, therefore, will not require that they be included with the application for certification. However, EPD reserves the right to require that copies be provided, if the need does arise. Software documentation shall include at least the following:

(a) Complete program listings, including the source code as will as the object code in both machine-readable and paper form, shall be provided upon request. These listings are not required to be submitted with the application for certification.
(b) Functional specifications.
(c) Functional flowcharts of the manufacturer's software.
(d) Sample inputs and outputs from all processes.
(e) Detailed interface information on the optical bench including the identification of protocol and output specifications.
(f) All file layouts with file names, file types, file security, field names, field types, field sizes, and field editing criteria.

(2) Documentation provided by the vendor to meet this requirement will be treated as proprietary information by the State provided such material is clearly marked as confidential. Gross marking of all material as confidential is not acceptable. Mark only that material which is proprietary.

(3) These requirements are imposed to permit EPD to both operate and check out the GAS units. Doing so requires full file descriptions and either the detailed code or a full set of routines with all necessary protocol to perform the GAS functions.

(4) The purpose of the requirement for detailed code is to provide the State with a mechanism to assure continued performance of the inspection stations in the event that a major supplier should fail. The State is not interested in any disclosure of proprietary information or in the detailed inner workings of vendor code. However, it is essential that

all of the necessary working code, schematics, drawings, and so forth be available in case of such demise.

1.20 Availability of Circuitry

All integrated circuits used in the GAS shall be types and brands that are presently in common usage. Custom ROM programs developed by the manufacturer for building the analyzer are allowed.

1.21 State Access

(1) The State field representatives must have access to update certain portions of the analyzer software. The software shall be designed to include a QA and State Representative Menu as indicated in Section 3. Access to the QA/State Representative Menu will require the entry of the access code. The analyzer will change the access code on a daily basis by using an algorithm that will be provided by the State during the certification process. Upon the delivery and set-up of an analyzer, the analyzer shall have the state "LOCK OUT" function preset to the "ON" position to prevent the analyzer from being used in the I/M inspection mode until it has been initialized by a State or QA representative. Information contained in the files associated with the QA and State Representative Menu shall be hidden in software to the States' satisfaction. The access code shall consist of five alphanumeric characters.

(2) GAS manufacturers shall provide training for field personnel of the State and of the QA contractor in accessing and using the State/QA Menu functions. Manufacturers shall prepare an instruction manual approved by the State for the QA/State Representatives in adequate quantities and perform on-site training using the manual at locations, and on dates, designated by the State. In addition, the manufacturer shall provide an adequate number of keys within 15 days of certification, required for EPD/QA personnel to perform their respective functions.

1.22 Data and File Transfer

(1)Calibration Records: All calibration, vehicle test records, and other GAS files shall be capable of being transferred from the GAS in two ways:

(a) By use of the standard 3.5" 1.44Mb compatible floppy disk on which data is stored.

(b) Via an IBM PC compatible modem and connection to a telephone line. Upon contact, the GAS is to verify authorization for access via password and then send and/or receive files as commanded by the state authorized connecting computer.

(2) The modem shall interface with the GAS through a modular telephone connector or standard RJ-11 telephone jack secured to the outside of the cabinet to allow replacement without causing the tampering mechanism to be tripped. Alternatives to this requirement, which will improve the durability of the interface and/or the telephone line, are encouraged and may be proposed by the manufacturer for evaluation by the program administration.

The GAS shall provide the power necessary to activate the modem.

(3) EPD/Contractor GAS Message Capability
The GAS will download EPD and Contractor-generated GAS messages only during VID contacts. The file name where the message will be held will be called BARMSG.REC. If more than one page is to be displayed, the inspector shall be instructed to "strike any key to continue". When the entire GAS message has been displayed, a menu shall be displayed as follows:

ENTER ONE OF THE FOLLOWING NUMBERS:

1. PRINT A COPY OF THE EPD OR CONTRACTOR (GAS) MESSAGE

2. READ THE GAS MESSAGE AGAIN

3. EXIT

Display [1.22]

When the inspector selects "EXIT", the GAS message shall be stored.
If the inspector selects #1, the GAS message shall be printed. If the inspector selects #2 the GAS message shall be displayed again. If the inspector selects #3, the analyzer shall return to the previous screen displayed prior to the GAS message.

The GAS shall store the last 100 messages sent down from the VID by the management contractor. The GAS messages shall be stored and recalled by DATE and TIME. The DATE and TIME stamp shall be made at the time the download occurs by the GAS. The first GAS message displayed shall be the most recent GAS message sent (last in first read). A menu item for GAS message recall shall be listed on the MAIN MENU and not require pass-code protection. The GAS shall allow the inspector to scroll through the list of GAS messages and select a single GAS message based on DATE and TIME. The file format and location is up to the GAS manufacturer. Once a message is located, the GAS shall allow the inspector to view or print that GAS message. See Display [1.22] above.

(4) Diskettes in the state drive 'A' must be removable and show full compatibility with existent State or contractor microcomputers. Both a 3.5" floppy drive and the port must be secured logically and physically to permit only authorized state and manufacturer access. Vendor methodology to restrict such access shall be approved by the Program Administration.

(5) Manufacturers will be responsible to demonstrate full system compatibility as well as diskette and modem transfer of files to the State or management contractor.

1.23 Test Record Storage Capacity

The GAS hard disk drive shall have the capability to store at least 1000 current test records not counting those on backup. The GAS shall have the ability to retrieve and print the last 1000 tests. Storage shall be maintained with power off. Search and retrieval shall be made using, at a minimum, a DATE, or VIN search criteria. Each field shall have the ability to be searched individually. A scrollable list shall be displayed once the search criteria have been met.

Section 2 - Software Functions

The microcomputer software shall control the inspection sequence and equipment processes. This software shall at a minimum, require that inspector to proceed in general, the following sequence when performing a vehicle inspection (See Appendix O):

1. Enter the inspector access code number;
2. Enter vehicle identification data;
3. Contact the VID with vehicle data,
4. Conduct an OBD test, if required,
5. Conduct a tampering inspection and enter the results; if required,
6. Perform the appropriate emission test; if required
7. Conduct the Fuel Cap inspection;
8. Enter the repair data if applicable;
9. Contact the VID if the vehicle FAILED the inspection,
10. Print the required test report when the inspection is complete.

During the advisory period: If the OBD tested vehicle passes then no visual tampering (cat) test shall be performed, a fuel cap test shall be performed. If the OBD tested vehicle fails the OBD test, said vehicle shall not be failed for the OBD failure, it shall be inspected for tampering and given a standard ASM tailpipe test (unless otherwise exempted) and be given notification of the OBD system failure. This vehicle shall be given a fuel cap test.

After the advisory period: NEWER vehicles shall be passed or failed on OBD results as defined in this document. OBD tested vehicles, pass or fail, shall be given a fuel cap test.

A detailed description of these tasks follows:

2.01 GAS Initialization

The following analyzer data must be entered by a QA/State representative for the GAS to be ready to perform Georgia Emission Test inspections:

- Station Number
- GAS Number
- Primary Network Phone Number
- At least one Inspector License Number (via VID only)
- Calibration GAS values

Note: Inspector information is not required to initialize a GAS unit.
Also, refer to Section 3.01 for additional information regarding Network Initialization and Update Network Communication Data. After the required data have been entered into the GAS, the QA/State representative shall establish initial network communications to the VID using the "Network Initialization/Update Communication Data" function.

2.02 Station Number and Inspector Access Codes

(1) The GAS shall be designed to require the entry of a special access code by the inspector before a Georgia Emission Test inspection can begin. The access code shall neither be

displayed nor printed on the test report. This special access code number shall be linked to the inspector license number. Two types of inspector's licenses will be issued restricting the model years of vehicles that they can inspect. The inspector license number will reflect which type of license an inspector possesses. The license number will begin with "BA" for inspectors that are limited to newer model year vehicles. The number will begin with "AA" for inspectors whose license is unlimited. The analyzer software shall be designed to automatically abort the inspection if the inspector has not been authorized to perform the test selected based on the model year (MY) of the vehicle. A message shall be displayed indicating that the test has been aborted because the inspector has not obtained the proper license from the State.
Note: This determination will be made before a test record is created.

(2) The GAS shall have the capacity for storage of a minimum of 200 inspector records.

(3) The microcomputer shall be designed to allow the inspector's license number and each inspector's access code to be changed only by the VID. The Station Number will be automatically recorded on the test report along with the Inspector's License Number.

(4) The station and the inspector license numbers and names shall be printed on the VIR.

(5) Station and inspector license numbers must all begin with two alpha characters followed by six numeric characters. Certificate numbers must be two alpha followed by six numeric characters. The analyzer shall not be allowed to go into the Georgia Emission Test inspection mode unless the analyzer has a valid station number, GAS number, PEF value, GAS values, e-certs, at least one licensed inspector in the analyzer, and has passed a complete three-day calibrations.

(6) From either the station or main menu, there shall be a selection for entry of the station name and address for printing on the VIR. This menu item does not have to be secured by password. Fields required for entry of this information shall be as follows:

- Station Name -25 alphanumeric characters
- Address -20 alphanumeric characters
- City -13 alphanumeric characters
- Zip - 10 characters the first 5 must be numeric
- Station Telephone Number - 12 numeric characters

2.03 Applicable Model Years

The GAS shall accept any covered model year vehicle for performing a training test as it would for the certified emissions inspection. The GAS shall read the current MY exemptions in a file to be updateable by the VID. Currently the newest three model years are exempt from testing, however the GAS shall have the ability to override this exemption based on the motorist request. Any vehicle attempted to be tested that is older than the allowed oldest model year vehicle as defined in the STATION.DAT (as updated through the PROGRAM.DAT) file is not to be tested, the GAS shall abort the test (free abort) and note that the vehicle is not subject to testing, but may only be tested in manual mode.

2.04 Gross Vehicle Weight

For the case where the operator tells the GAS that the "Vehicle Standards Type" is a "T" (Truck),

the GAS shall then request the Gross Vehicle Weight (GVW) to be entered. If the GVW is greater that 8500 pounds, the vehicle is exempt from testing. The ESC Table will be used to select emission standards. The vehicle standards (P, T, G or H) shall be recorded on the test record.

2.05 Vehicle Make Entries

The analyzer software shall be designed to accommodate all of the vehicle make names going back to 1975 as contained on the VRT (maximum 17 characters). The full names of each vehicle make must be displayed and printed on the original VIR and on any VIR reprints, and shall be recorded in the test record. The software shall be designed to first display a list of vehicle makes. The inspector shall then be instructed to select a make using the cursor and scrolling through the list or by typing in the first letter or two of the make so that the cursor goes directly to the first make with that letter in it, or a combination thereof.

Once a make is selected, a table of corresponding models only pertaining to the MY and Make entered must be displayed and the inspector instructed to choose one.

When a make or model name is not contained in the reference table, the inspector shall be instructed to enter the names (no abbreviations) through the keyboard.

2.06 Safe-To-Test Inspection

Prior to commencing the emissions inspection, the inspector shall examine the vehicle to ensure that it is safe-to-test and properly prepared for testing.

(1) Accessories: The inspector shall ensure all switchable vehicle accessories (air conditioning, heater, defogger, radio, etc.) are turned off prior to commencing the emissions inspection.

(2) Exhaust Leaks: The inspector shall determine if the vehicle's exhaust system leaks exhaust gases. The inspector shall make an audio and visual assessment while partially blocking the exhaust flow at the end of the exhaust pipe. The inspector shall not perform an emissions inspection of vehicles with leaking exhaust systems.

(3) Fluid Leaks: The inspector shall determine if the vehicle is leaking engine oil, transmission fluid, fuel, or coolant. The inspector shall not perform an emissions inspection of any vehicle with leaking fluids.

(4) Mechanical Condition: The inspector shall make an auditory and visual evaluation of the vehicle's mechanical condition (engine, transmission, and brakes). If the inspector's evaluation identifies a mechanical condition that may create a safety hazard or may result in additional mechanical damage to the vehicle during the emissions inspection, the inspector shall not perform an emissions inspection.

(5) Operating Temperature: For older vehicles, the inspector shall determine if the vehicle's engine is at its normal operating temperature prior to the start of the emissions inspection. The inspector shall make a visual examination of the engine temperature gauge, if equipped and operating, to assess the engine temperature. The inspector shall not perform an ASM or TSI emissions inspection on vehicles in which the engine is above the normal operating temperature range.

2.08 Test Information

The analyzer software shall be designed to utilize the State's Vehicle Reference Table for most 1975 and newer model year vehicles. Emission standards, dilution thresholds, and maximum RPM limits will be determined from the emission standards categories table. The software shall be designed to immediately initiate a search through the Vehicle Reference Table as soon as enough information is entered to determine the appropriate VRT row number to obtain test parameter information (vehicle test weight and test horsepower for ASM, and emission standards).

2.09 OBD Test – Newer Vehicles

Vehicles MY 1996 and newer shall receive an OBD evaluation as outlined in Appendix-F OBD Test Sequence. Newer vehicles shall then receive a functional check of their fuel cap(s).

2.10 Tampering Inspection

Vehicles older than MY 1996 unless otherwise exempted (i.e., Grandfathered without a catalytic converter), or newer vehicles not receiving an OBD test shall receive a tampering inspection. The tampering inspection shall consist of either a direct visual observation of the catalytic converter(s), or indirect visual observation of the catalytic converter(s) using a mirror, video camera, or other visual aid. While conducting the visual observation of the catalytic converter(s), the inspector shall make a determination as to whether the catalytic converter(s) is/are present, appears to be properly connected, appears to be the correct type for the vehicle, and appears to have no external damage that would prevent the device from operating.

2.11 Emissions Test – ASM2 Test Sequence

The ASM2 test sequence will be performed on vehicles MY 1995 and older unless otherwise exempted (i.e. four wheel drive, traction control). The ASM2 test sequence is described in Appendix-G ASM2 TESTING SEQUENCE.

2.12 Fuel Cap Inspection

All vehicles subject to be tested shall have the fuel cap(s) on those vehicles inspected. The fuel cap inspection will require inspector to evaluate the fuel cap(s) to determine if it/they are missing or operating properly. The fuel cap test will be a determination of the fuel cap(s) to retain pressure. See Appendix I for the Fuel Cap test sequence.

The program will prompt for, and test two fuel caps if present and testable.

2.13 Pre-Inspection Repairs

Initial tests in Georgia shall not ask the inspector if pre-inspection repairs were performed.

2.14 Repair Action Information (After Repairs Tests Only)

(1) On all tests conducted after repairs have been made ("A" tests), the inspector is required to enter information regarding the repairs that were accomplished to reduce the emissions. The analyzer shall display all of the major repair categories and prompt the inspector to elect the category of the system(s) that were checked, repaired, replaced, or adjusted.

(2) The categories will consist of the items contained in Section 3.32, Repair Action Categories.

(3) A separate repair information form will be printed and provided to motorists who fail the test. Motorists will be required to complete the form, or have the repair shop complete the form, when repairs are completed. Information contained on this form will be entered at the time of the next retest.

2.15 Escape Command

An ESCAPE command shall abort an I/M test. A printout and a test record (for the hard disk) shall be produced which includes as much of the vehicle identification and test data as possible that was entered before the abort key was pressed. See Section 2.17 below for criteria for saving records and printing VIRs. The ESCAPE mode shall be capable of being entered with the pressing of one key maximum. If the inspector or GAS aborts the test sequence during the test (prior to completing all sections of the test), the remainder of the test shall not be completed. For example, if the inspector aborts an ASM test sequence then the GAS shall not perform a fuel cap test. The fuel cap test shall indicate a fail since this test was not performed.

2.16 Data Storage and Recall Capability

The analyzer shall have the capability to recall and display all test records that are stored on the GAS unit (1000), and to reprint a copy of the VIR for those stored vehicle test records. Recall shall be initiated by typing in the test date, VIN, or by cursor selection from the list of available vehicles. The inspector shall have the ability to transfer only the vehicle identification information (vehicle type, GVWR, year, VIN, make, number of cylinders, engine size, transmission type, and fuel type) on the test records recalled so that it can be used for subsequent tests. The inspector shall be required to re-enter the odometer and test type for subsequent tests. The analyzer shall allow the odometer and test type to be changed.

2.17 Decision Criteria

(1) The GAS shall be programmed to print the VIR and record the test results for all complete tests, and most aborted or incomplete tests, i.e., those for which a test record is written. If the test results are PASS for each test sequence required (or for the test sections which are required to be retested in the case of retests), the VIR will indicate that the vehicle has an overall passing result and that the Certificate can be used for registration.

(2) For the purposes of determining whether a vehicle has passed the overall inspection,

(a) For all vehicles:

- Field, FUNCTIONAL CHECK RESULT(S) shall have a "P" (pass) or an "N" (untestable) stored as a final result of the Fuel Cap Test Sequence (see Appendix I),

NOTE: The Functional Check Results shall be determined by the following:

1. The FUNCTIONAL CHECK RESULT field shall have a "P" if:
   - Field, Fuel Cap 1 Test Result, of GAS.DAT contains a “P” (pass), "R" (replaced/passed), or a "T" (tested again/passed), and,
   - Field, Fuel Cap 2 Test Result, of GAS.DAT contains a Blank, “P” (pass), "N" (untestable), "R" (replaced/passed), or a "T" (tested again/passed),

2. The FUNCTIONAL CHECK RESULT field shall have an "N" if:
   - Field, Fuel Cap 1 Test Result, of GAS.DAT contains an “N” (untestable) and,
   - Field, Fuel Cap 2 Test Result, of GAS.DAT contains a Blank, or an "N" (untestable),

3. The FUNCTIONAL CHECK RESULT field shall have a "Z" if:
   - Field, Functional Test Result, of GAS.DAT contains a "Z" (passed previous test),

(b) For newer vehicle that receive an OBD test the following shall have a "P" stored in it:

- Field, Overall OBD Test Result shall contain a "P"(Pass). Refer to Appendix –F for requirements to store a "P".

NOTE: OBD will not be used for determining Pass/Fail before the mandatory start date (See Appendix F).

(c) For older vehicles that receive a tailpipe emissions test (ASM2 or TSI), the following shall have:

- Field, Catalytic Converter, shall contain a “P” (pass), "N" (not originally installed), or “Z” (passed previous test), and
- Field, Final Emission Results, of GAS.DAT contain a “P” pass), or “Z” (passed previous test), then field, Overall Test Results, will be a “P” (pass).

(3) An initial test record will be saved at the point where the inspector confirms initial vehicle information entry. The record will be updated at the conclusion of each test sequence of the Georgia Enhanced I/M Test, and immediately prior to transmission to the VID (Section 3.34). If a test is aborted at any time prior to the creation of the initial test record, no test record will be saved on the GAS or transmitted to the VID and no VIR will be printed. If a test is aborted at any time after the creation of the initial test record, a VIR will be printed and the test record saved and transmitted to the VID.

(4) Once the new test record is established, for an initial test, the GAS is to “F” fill the following GAS.DAT fields:

- Field 39 ABORT CODE shall have a value of 50
- Field 66 Final Emission Result (ASM Mode 1 or TSI 2500 rpm)
- Field 82 Final Emission Result (ASM Mode 2 or TSI Idle rpm)

- Field 93 Overall Emission Result
- Field 110 Catalytic Converter
- Field 111 Overall Visual Inspection Result
- Field 140 Overall OBD Result
- Field 141 Fuel Cap 1 Test Result
- Field 142 Fuel Cap 2 Test Result
- Field 143 Functional Test Result

(5) After the test-record is created, and following the initial test, the “F” entry in each of the fields may be overwritten based on the specific test result.

(6) For an after-repairs test, if there is a communications failure and the previous test found in GAS.HST is an Abort (field 144 = “A”), then the GAS shall “F” fill the above noted fields and shall “Y” fill all Test Required Flags (fields 15, 16, and 17). Two areas (newer) or three areas (older) of the inspection: visual (older only), emission, and functional must be tested. Note: the VID no longer returns an aborted test as a previous inspection.

(7) For an after-repairs test, if the previous test is a fail (field 144 = “F”) and:

- The Catalytic Converter (field 110) of the previous test is either a “P” or a “Z”, then the GAS shall “Z” fill field 110 and “N” fill field 15 of the new test record (a “Z” will indicate the vehicle has passed, but the “pass” was determined on a previous test);
- The Overall Emission Result (field 93) of the previous test is either “P” or “Z”, then the GAS shall “Z” fill fields 66 and 82 and “N” fill field 16 of the new test record; OR
- The OVERALL OBD RESULT (field 140) of the previous test is either "P" or "Z", then the GAS shall "Z" fill field 140 and "N" fill field 16 of the new test record.
- The Functional Result (field 143) of the previous test is either “P” or “Z”, then the GAS shall “Z” fill fields 141 and 142 and “N” fill field 17 of the new test record.

(8) When printing the VIR, the GAS shall interpret both a “P” and a “Z” as “Pass”.

Section 3 - Display Prompts and Programming Criteria

(1) Section 3 describes the display prompts and programming criteria for the I/M inspection/test sequence. These items shall be standardized to facilitate training of licensed inspectors. Manufacturers may propose, for State approval, alternative methodologies for the presentation of information and for data entry as long as the substance and the priority of the sequence is not significantly modified. The GAS manufacturers shall utilize one or more of the following options to make the analyzer user-friendlier:

- Direct cursor addressing or first letter selection versus a scrolling display;
- Data entry using the bar code scanner on bar-coded information in the ECS guides, bar-coded VIN, and emission control labels;
- Method of displaying DATA ENTRY ERROR MESSAGES; and
- Development of HELP screens to assist inspectors with data entry

NOTE: Other options may be proposed for approval by the State.

(2) Data entry from one item to another shall not proceed until a valid entry has been made. The OBD or tampering and emissions, and functional inspections shall utilize vehicle identification and tampering inspection information to determine what OBD or tampering and emission, and functional inspection standards are appropriate for the particular vehicle being tested.

(A) Once the OBD or tampering inspection sequences have been initiated, the inspector shall be prohibited from editing any vehicle identification information.
(B) Once the emissions inspection sequence has been initiated, the inspector shall be prohibited from editing any tampering inspection information.
(C) Once the functional inspection sequence has been initiated; the inspector shall be prohibited from editing any OBD or emission inspection information.
(D) Once the functional test has been completed, the inspector shall not be able to issue an aborted test.

NOTE: Where editing is allowed, the inspector shall have the ability to return to a previous display prompt without depressing more than three keys. At that point, the inspector shall see the prior information and be permitted to insert and delete characters without having to retype the whole field.

3.01 Menus

(1) The following consists of the minimum of menus manufacturers are required to provide. Manufacturers may break the menus down further to increase user friendliness or expedite certain operations. The State reserves the right to require modification of any menu if we feel it does not meet the minimum requirements.

(a) Main Menu: The main menu shall display the following options:
1 TRANSMIT TEST DATA {DEFAULT}
2 GEORGIA EMISSION TEST

3 MANUAL TESTING MODE
4 THREE-DAY CALIBRATIONS AND LEAK CHECK
5 STATUS PAGE
6 QA/ STATE MENU
7 OPERATOR TRAINING
8 RECALL PREVIOUS VEHICLE TESTS
9 DIAGNOSTIC AND REPAIR INFORMATION
10 NETWORK COMMUNICATION DIAGNOSTICS
11 STATION MANAGER MENU
12 GAS MESSAGE SEARCH AND RECALL

[Display 3.01(1)]

(2) Inspector Information: Each inspector qualification number consists of two alpha characters followed by six digits. Valid combinations of alpha characters are as follows (nnnnnn represents the numeric portion):

(a) The following are valid inspector license number formats:
AAnnnnnn Regular inspector license (ASM / OBD / TSI)
BAnnnnnn Newer vehicle inspector (OBD / TSI)

(b) The VID shall determine who is allowed to perform inspections on a given age of vehicle by updating the TECH.DAT file during a DATA FILE REFRESH.

(c) Associated with each qualification number, in addition to inspector name and access code, is a license expiration date in the MMDDYYYY numeric format. This field must be entered for all inspectors. The GAS shall prevent an inspector whose license has expired, or been suspended, or revoked from performing a Georgia Emission Test.

(d) The inspector shall initiate an I/M inspection/test by entering the number "2", the manual testing mode by entering the number "3", and so forth. A brief description of each item in the menu follows.

(3) Default Values: The following entries will be allowed to have the indicated default responses. Manufacturers may include, subject to EPD approval, other default settings.

VEHICLE INSPECTION

Field	Default
Test Type	Annual {Initial}
Vehicle Type	Passenger
Fuel Type	Gasoline
Dual or Single Exhaust?	Single
Vehicle Make	(manufacturer's choice)
Main Menu	TRANSMIT TEST DATA

VIR ISSUANCE SEQUENCE

Are the VIRs in the printer ready to print?	Yes
Do you need to print another VIR?	No

The VIR is to be printed on white paper with black ink on a finished size of 8.5 by 11 inches. Stations may print a second copy, or utilize two-copy paper, for their records.

(4) Main 1 - Transmit Test Data: This is the default selection on the Main Menu. This selection shall initiate a data upload by performing a "Request Lockout Status" VID communication sequence. This is intended to upload any stored GAS.DAT records if not uploaded previously.

(5) Main 2 - Georgia Emission Test: The analyzer shall initiate, run, and terminate the I/M inspection/test sequence in accordance with the specifications. Detailed Georgia Emission Test procedures begin with Section 3.10, Inspector Access.

(6) Main 3- Manual Testing Mode: As soon as the analyzer meets the warm-up criteria, selection of the Manual Testing Mode shall cause the analyzer to conduct an automated electronic zero and span and then begin taking emission readings. The emission readings shall be displayed in large; easily read characters by a person with 20/20 vision from a distance of eight feet, in the following format:

EMISSION	**READING**
HC	**XXXX**
CO	**X.XX**
NO (where applicable)	**XXXX**
CO_2	**XX.X**
O_2 (optional)	**XX.X**

[Display 3.01(2)]

(7) Main 4- Three-day Calibration and Leak Check

(a) A three-day GAS calibration, leak check, and fuel cap calibration is required. A dynamometer calibration is also required for ASM systems. Selection of this item shall bring up a set of calibration and leak check procedures. The procedures shall be user-friendly and shall indicate every step needed to properly perform the required calibrations and leak check (including when it is necessary to turn the gas cylinder valve on and off for the gas calibration). Procedures shall be approved by the State.

(b) Results of the leak check and the calibrations shall be displayed and recorded in the CAL.DAT file.

(c) The system shall preclude I/M testing after 72 hours if a leak check and all required calibrations are not performed and passed. If the analyzer fails the three-day calibrations or the leak check, a message shall be displayed indicating that it failed and shall suggest possible inspector-fixable causes for the failure; e.g.,

"CHECK GAS CYLINDERS SHUT /EMPTY/CONNECTED TO WRONG PORTS. TRY AGAIN. IF NONE OF THESE, CALL SERVICE."

[Display 3.01(3)]

(d) Provisions shall be made to allow an inspector to perform each calibration separately, i.e., an inspector shall not be required to perform all calibrations every time the calibration menu is selected. The individual calibrations shall be listed as a submenu of the Three-Day Calibrations menu item. The Three-Day Calibrations and Leak Check menu shall also include an option for changing the calibration gas bottle. A new GAS calibration and leak check shall be required whenever a GAS bottle is changed.

(e) Change Gas Cylinders

1. When this submenu item is selected, the operator shall be instructed to enter the

new gas cylinder values.

SELECT THE GAS BOTTLE TO BE CHANGED:

HIGH RANGE SPAN
ZERO GAS

[Display 3.01(4)]

2. After the selection is made, the operator shall enter the bottle values for HC (ppm), CO (%), CO_2 (%), NO (ppm)(for ASM) and O_2 (%). The values entered shall be within 5% of the nominal values for that range. If not, the operator shall be prompted:

THE VALUES ENTERED ARE NOT WITHIN THE ALLOWABLE RANGE. REENTER THE GAS VALUES.

[Display 3.01(5)]

3. The operator must enter values within the 5% tolerance before being allowed to proceed. When appropriate values are entered for all gas values, the new values will replace the gas bottle values previously stored in the unit. The operator shall then be prompted to connect the new bottle and to perform a gas calibration. The unit shall be calibrated using the normal gas calibration procedures. The unit shall be locked out until the calibration is performed and passed. The GAS shall not be locked out due to Oxygen sensor failure.

Note: If a bar code reader is attached a procedure will be added to allow bar code scanning of bottle values. Manufacturers may use the barcode entry method to enter bottle values.

(8) Main 5- Status Screen: Selection of this item shall cause the CRT to display a status screen containing the following information:

- GAS ID number
- PEF number
- Span gas cylinder values
- Dates and times of last required calibrations and leak check
- Date GAS was last serviced (date service menu was accessed)
- Time and date
- Active software version number
- Update software version number
- Update activation date
- Date and time of last network access
- Number of Georgia Emission Tests since last network access
- Station license has expired, been suspended or revoked
-

(9) Main 6 - QA/State Menu

(a) The State and QA access to initialize the analyzer must be in place at the time the analyzer is delivered.

(b) The access codes for the QA, EPD representatives, and manufacturer's service staff shall be displayed as X's on the screen.

(c) The manufacturer shall display the following menu options for the QA inspectors and

State field representatives:

1. LEAK CHECK
2. GAS AUDIT
3. UPDATE STATION INFORMATION
4. INSTALL NEW DATA DISKS
5. LOCKOUT GAS
6. PERFORM SOFTWARE UPDATE
7. TEST RECORD SEARCH AND RETRIEVAL
8. REFEREE TEST
9. NETWORK INITIALIZATION/ UPDATE NETWORK COMMUNICATIONS DATA
10. VIEW INSPECTOR INFORMATION
11. GAS CLOSEOUT
12. RESET MANAGER ACCESS CODE

(d) Access to the QA and State Representative Menu will require entry of an access code. Information contained in the files associated with the QA and State Representative Menu shall be hidden in software to the State's satisfaction.

(i) The access code shall consist of five alphanumeric characters. When QA/STATE MENU is selected, the analyzer shall display the following message:

ENTER THE QA/STATE ACCESS CODE

[Display 3.01(5)]

(ii) QA 1 - Leak Check: Instructions for conducting a leak check shall be displayed on one screen and shall not require acknowledgment by the QA inspector except to indicate when he/she is ready to begin the leak check. The following message shall be displayed at the bottom of the leak check instruction page:

HIT THE SPACE BAR WHEN YOU WANT TO START A LEAK CHECK

[Display 3.01(6)]

(iii) QA 2 - GAS Audit: The GAS shall default to propane and no dilution correction factor (DCF) but shall give the auditor the option to specify otherwise:

PROPANE OR HEXANE? (Default is Propane)

[Display 3.01(7)]

1. After a response is entered:

WITH OR WITHOUT DCF? (Default is without DCF)

[Display 3.01(8)]

2. After a response, follow the same instructions indicated under "Manual Mode Testing" above.

3. GAS units with weather stations shall display weather information on the screen during the GAS audit process.

(iv) QA 3 - Update Station Information: Selecting this item will cause the analyzer to display a table showing the station license numbers as follows:

STATION NUMBER	GAS UNIT NUMBER
(8 alphanumeric)	(8 alphanumeric)

The manufacturer shall allow the Station Number and the GAS Unit Number to be edited. Refer to Section 4.01 (1)(d) for GAS designation.

(v) QA 4 - Install New Data Disk: The manufacturer shall display instructions, on a single screen, for changing the floppy disk. The instructions shall meet State approval. If the floppy disk is changed, the analyzer shall check the newly installed data disk for existing GAS records. If records are found, the analyzer must prompt the user to install a blank disk. Once a valid floppy disk has been installed, the analyzer shall automatically format the new floppy disk.

(vi) QA 5 - Lockout GAS: The following are lockouts set by the VID:

- QA/State GAS lockout	ON/OFF
- QA/State ASM lockout	ON/OFF
- Cabinet Tampering	ON/OFF
- State disk drive tampering	ON/OFF
- Certificate area tampering	OFF
- Station license suspended	ON/OFF
- Station license revoked	ON/OFF
- Station license expired	ON/OFF
- Failure to pay for certificate numbers purchased	OFF
- Failure to pay for communications services	OFF
- Certificate Sequencing Error	OFF
- X tests performed w/o VID communication within Y hours	ON/OFF
- VRT corrupt	ON/OFF
- ESC_ASM.DAT Corrupt	ON/OFF

1. The manufacturer shall allow the lockouts to be set or reset.

2. The analyzer manufacturer shall devise a method to allow the I/M inspection and test program to be disabled and still allow all other functions to work properly. The analyzer shall display a message stating the reason for the lockout if it is locked out from I/M testing.

3. QA/State Representatives shall be able to clear lockouts set by the State staff or they may be cleared through the VID. The analyzer software shall be designed to allow the State to set or clear the lockouts on a particular analyzer using the VID.

4. The QA/State Representatives shall be able to view the type(s) and location of all tamper-lockouts.

(vii) QA 6 - Perform Software Update

1. Any software updates shall be performed by manufacturer representatives, or other method approved by EPD. Each GAS unit shall contain a virus detector program, subject to EPD approval, which shall verify the integrity

(i.e. check for infection/corruption) of each update disk or decompressed file before it is applied to the GAS. Infected/corrupted software shall be blocked from installation.

2. In lieu of this requirement, the GAS manufacturer may submit to EPD written procedures clearly illustrating how the GAS manufacturer intends to meet the intent of the "Virus Protection Program" requirement. These procedures shall demonstrate how the integrity of the GAS software and update software or decompressed file shall be protected under all circumstances.

3. EPD has the option to accept these procedures or, if they are insufficient to provide the degree of protection required, EPD may require that the GAS manufacturer install a "Virus Detection Program" in each GAS unit.

4. When emergency software updates are required, the manufacturer is responsible to develop the update and provide it to the State on a 3-½ inch floppy disk. The State may have the QA inspectors install the update and will therefore need enough copies as determined by the management contractor. The update shall be made as simple as possible for the QA inspector by using display driven instructions, batch files, etc.

5. Selection of the 'Perform Software Update' menu item will allow the entry of the complete VRT and default VRT tables. The QA representative will then be instructed to insert the VRT disk(s). The disk data will replace the existing VRT and default VRT, and the Version Date file. The Version Date file includes the date (14 characters, yyyymmddhhmmss) and the number of records in the VRT.

6. The table may be periodically revised on a "row-by-row" basis. The GAS shall send the version date and the number of records in its VRT file to the VID on every communication transaction, except diagnostics, as part of the security login. The version date file will be updated if the table is revised.

7. The equipment manufacturers will use the same search sequence on the VRT.DAT. The search sequence shall be: model year, vehicle make; vehicle model; body style (1 through 6); number of cylinders; engine size; and transmission type.

8. When a "VRT Update" file is received from the VID, the GAS shall store the file to the hard drive until a period of relative inactivity (e.g. between emission inspections). Each VRT update record will be preceded by a single character and shall be processed as follows:

- "C" = replace record (same row ID),
- "A" = append record (new row ID),
- "D" = delete record (same row ID).

(i) The VRT Update file may appear to be corrupted if either of the following conditions exists:

(ii) The version date sent by the GAS does not match any dates stored in the "VRT Update History" table in the VID (second consecutive occurrence).

(iii) The number of records in the GAS' VRT.DAT does not match the appropriate number of records for that version date (determined at the VID).

(iv) If possible, corruption is detected by the VID; the VID will send a response bit to the GAS. The GAS, upon receiving the response bit, shall display the following prompt:

THE VRT DATABASE IS CORRUPT. CALL SERVICE.

[Display 3.01(9)]

(v) If the VRT file has not been replaced, a lockout shall be set. This lockout can only be cleared by the VID upon replacing the file providing the VID has verified that the VRT data has been replaced.

(ix) QA 7 - Search and Retrieve Test Records: The search shall locate, display and printout test and calibration records based on knowledge of the vehicle license number, VIN, date/time or certificate number. Once a test record is located, the QA/State Representative shall be allowed to review the previous test records as well as those that follow the target record. If an exact match is not found, the closest match shall be displayed. Once a record is located, the QA or state representative shall be allowed to review the complete vehicle inspection or calibration record and print the record using the VIR printer.

(x) QA 8 - Referee Test: The QA/State Representative menu shall also allow the QA or State representative to perform a referee test from the GAS. This option will allow the QA/State person to observe while a station inspector performs a complete inspection using the same procedure as for a regular inspection starting with the entry of inspector access code and the previous certificate number. The inspection shall generate a test record and VIR in the same manner as a regular "After Repairs" inspection, except that the test type shall be entered as "R" and the VIR shall indicate that it is a "REFEREE TEST". In order to complete the inspection, the inspector will enter "yes" when asked if a repair data form was provided and then enter no repairs and zero cost.

1. In the case of a PASSING referee test, or in the case of a referee test that is aborted with an abort code equal to or greater than 50, the certificate number will be the same as for the previous inspection, However, this test will not be counted as either a paid test or free retest for the purposes of certificate accounting. The test fee shall be automatically entered as "free". Therefore, no fee prompt shall be provided.

2. In the case of a Failing referee test, or in the case of a referee test that is aborted with an abort code less than 50, the test result will be FAIL, and a certificate number assigned in the same manner as any other failed test. The test fee will be either free or paid, depending on the fee paid for the previous test.

(xi) QA 9 - Network Initialization/Update Communications Data: A "Network Initialization/Update Communications Data" menu item shall be part of the QA/State menu. When selected, the following data shall be required for communications with the VID:

- Primary network phone number	up to 15 numeric and commas
- Station license number	8 alphanumeric
- D&R Vendor Name	if available
- Network phone number for D&R Vendor	if available

1. The GAS shall provide space for vendor names and telephone numbers within the "Update Communications Data" function. The data will be stored on both hard and floppy disks. The file is defined as follows:

   (i) Directory/File Name C:\TASDATA\VIDCOMM.DAT (hard disk)

2. The QA/State representative shall establish first time network communications between the GAS and the VID after a GAS unit has been initialized.

(xi) QA 10 - View Tech Information: This menu selection will allow the auditor to view the inspector information data file. The inspectors shall be listed showing their Inspector ID number. There shall be the ability to select a specific inspector and if F2 is pressed, the selected inspector access code shall be displayed for a period of two seconds. Only the selected inspector access code is to be displayed.

(xii) QA 11-GAS Closeout: This menu selection allows the auditor to close out a GAS unit without the need for an FSR. At a minimum shall remove station specific files after the auditor has printed the inventory and status information. The Closeout function shall remove the INVENTRY.DAT and STATION.DAT files from "C" drive and the back-up on "A" drive.

(xiii) QA-12- Reset Manager Access Code: The auditor will be able to reset the station manager access code to the equipment manufacturer default setting when this item is selected.

(10) Main 7- Operator Training: Operator Training Prompts shall be provided to allow the operator to perform a practice Inspection in accordance with the requirements specified in Section 1.14, Training. The GAS shall allow the operator to perform an OBD, ASM, or TSI test in the training mode. The GAS shall only allow subject model year vehicles to be tested in TRAINING mode. The GAS shall not connect to the VID or use an e-cert during a training test and shall indicate that is a training test on the VIR.

(11) Main 8- Vehicle Information: Prompts shall be provided so that the operator is allowed to review previous vehicle test records in accordance with the requirements specified in Section 2.17, Data Storage, and Recall Capability.

(12) Main 9- Diagnostic and Repair Information: Note: See Appendix C (VIDCOMM.DAT). References to ALLDATA have been removed.

(13) Main 10- Network Communications Diagnostics: "Network Communications Diagnostics" shall be included in the "Main Menu" and shall be used to diagnose communication-related problems. The following diagnostic tests shall be provided:

MODEM SERIAL PORT DIAGNOSTICS
NETWORK DIAGNOSTICS

[Display 3.01(10)]

(a) Modem serial port diagnostics shall be manufacturer provided pursuant to manufacturer-specific hardware configurations.

(b) It is the responsibility of each GAS manufacturer to work with the ET vendor to ensure that the modem strings are set up automatically and correctly. The modem strings will be set up in a data file (refer to the ESP communications Protocol) for the ET vendor's software.

(c) The GAS shall provide the data needed to conduct network diagnostics (from C:\GASDATA\DIAGNOSE.DAT). Each individual GAS manufacturer determines the size and characters. During the network diagnostics routine, the GAS shall transmit the data to the VID and subsequently the same data shall be transmitted back from the VID to the GAS. The data file "Network Diagnostic Transmit Record" shall be transmitted to the VID and the data file "Network Diagnostic Receive Record" shall be sent back to the GAS from the VID. They should be identical upon completion of the network diagnostics routine for this test to pass. The GAS shall display the following message:

TRANSMITTING DATA PLEASE WAIT.

[Display 3.01(11)]

Programming Criteria

1. If, upon completion of network access, the data transmitted by the GAS to the VID is the same as the data received by the GAS from the VID, then the GAS shall display the following message:

NETWORK COMMUNICATIONS PASSED.

[Display 3.01(12)]

2. If, upon completion of network access, the data transmitted by the GAS to the VID is not the same as the data received by the GAS from the VID, then the GAS shall display the following message:

NETWORK COMMUNICATIONS FAILED.

[Display 3.01(13)]

3. If network communications access is not achieved, the GAS shall display the following message:

CANNOT ACCESS NETWORK. CALL HELP LINE

[Display 3.01(14)]

(14) Main 11- Station Manager Menu

(a) Station Manager 1 - Network Communications Data
The GAS shall have a "Network Communications Data" selection in the "Station Menu". Using this menu the GAS shall allow enabling or disabling the diagnostics and repair information vendor. This item shall allow editing of the following information:

- Primary Phone Number
- D&R Vendor Name, Address, and Phone number

(b) Station Manager 2 - Request Lockout Status

A feature, "Request Lockout Status", shall be made available as a station manager function which will allow the station manager to request that the VID clear a state installed lockout. The lockout(s) that may be cleared (as applicable) by the VID are the following:

- QA/State GAS lockout
- QA/State ASM lockout
- Cabinet Tampering
- State disk drive tampering
- Certificate area tampering (always clear)
- Station license suspended
- Station license revoked
- Station license expired
- Failure to pay for certificate numbers purchased
-
- X (Variable Number set by the VID) Georgia Emission Tests (running total) performed w/o communicating to VID in Y hours
- VRT Corrupt
- ESC_ASM.DAT Corrupt

1. Upon selection, network access shall be attempted and, if successful, the VID shall return the revised lockout status even though the lockout might not have been removed.

TRANSMITTING DATA PLEASE WAIT.

[Display 3.01(15)]

Programming Criteria

(i) If, upon completion of network access, the VID indicates that a lockout(s) has been cleared, then the GAS shall clear the appropriate lockout flag(s).

(ii) If, network access to the VID is not achieved, the GAS shall display the following message:

CANNOT ACCESS NETWORK.

IF THIS MESSAGE PERSISTS,
PERFORM MODEM DIAGNOSTICS, OR
CALL YOUR SERVICE REPRESENTATIVE.

[Display 3.01(16)]

(c) Station Manager 3 - Review Certificate Inventory

A feature, "Review Certificate Inventory", shall be made available as a station manager function in the "Station Manager" menu. This feature shall display the number of certificates currently residing in the inventory.

NOTE: **NEVER DISPLAY VERIFICATION SEED**

1. The variable length ASCII text format inventory file is defined in Appendix C and stored in the

following locations:

Directory/filename: C:\GASDATA\INVENTRY.DAT (hard disk)
A:\INVENTRY.DAT (floppy disk)

(i) Start certificate number becomes "next" certificate number as certificate numbers are issued.

(d) Station Manager 4- Data File Refresh

The GAS shall have a "Data File Refresh" as a station manager function in the "Station Manager" menu. This feature shall allow the station manager or other authorized station personnel to place a request to the VID to update certificate numbers (that the GAS currently uses and those, if any, that are stored in the inventory), inspector's information and ESC Tables, any VRT updates and the PROGRAM.DAT file.

1. The GAS shall overwrite the existing tables with the refreshed data received from the VID.

2. Whenever the "Data File Refresh" item is selected and before performing the data refresh sequence, the GAS shall display the following message: (Alternative methods may be used upon approval by EPD)

THE VID SHALL UPDATE THE INSPECTOR INFORMATION FILE AND THE CERTIFICATE NUMBER INVENTORY.

YOU MUST PRINT THE CURRENT INSPECTOR INFORMATION AND CERTIFICATE NUMBER INVENTORY.

[Display 3.01(17)]

3. Prior to proceeding, the "Data File Refresh" the GAS shall display a list of inspector license numbers and certificate number inventory that currently exist in the GAS and shall provide an option to print, if desired. Then the GAS shall prompt the inspector to perform the refresh sequence.

4. Upon completion of the "Data File Refresh" sequence the GAS shall display the following message:

THE INSPECTOR LICENSE NUMBERS AND ACCESS CODES AND CERTIFICATE NUMBERS HAVE BEEN UPDATED BY THE VID. PLEASE CHECK AND IF THERE ARE PROBLEMS CONTACT THE HELP LINE

[Display 3.01(18)]

5. The GAS shall display the updated list of inspector license numbers and certificate number inventory. During screen display or printing of the inspector information, the GAS shall not display the actual inspector access codes (hidden) so that unauthorized person(s) may not view them

(e) Station Manager 5 - Station Fee Maintenance

1. This menu option will bring forth a screen that will allow the station manager to set the paid test fee that will be charged for emission tests at that station. The number will be less than or equal to the ‘Max paid test fee’, or greater or equal to the 'Min paid test fee' in the FEE.DAT file. The "Max paid test fee" and "Min paid test fee" for both TSI and ASM will be VID adjustable. The fee limits will be transmitted in the PROGRAM.DAT file.

2. Immediately after entering the paid test fee, the newly entered paid test fee will be displayed for verification. The station manager will have the option of accepting or canceling the operation. If accepted, the value in the FEE.DAT file will be changed immediately. If canceled the file will not be updated and will retain whatever value existed previously as long as the previous value is valid.

(f) Station Manager 6 - Certificate Status Report

1. This menu will allow station operators to order a standard report on:

- The number of certificates ordered,
- The number of certificates used,
- The current inventory of certificates held by the station, and
- Other information needed by the operator to perform accounting and other business functions at the station.

2. A request for this report will be sent to the VID. The VID will batch-run a two-page report on a monthly basis and will be available on the first Monday following the first weekend of the month. The report will be available for the balance of the month and at the start of the following month until the next batch job is run.

3. The first page of the two-page report will contain the deposits, certificate purchase. The second page will show certificates purchased and inventory of the previous month.

4. The report will be prepared overnight and transmitted as an EPD message during the next VID contact. This will allow station operators to receive this report on whatever frequency they desire for accounting purposes. The exact form of the report is to be determined.

(15) Main 12- GAS MESSAGE SEARCH AND RECALL: This function shall allow the inspector to search and view the GAS messages stored on the analyzer. Search and retrieval of the stored GAS messages shall be as prescribed in Section 1.22.

3.02 Print Screen Capability

The GAS shall have a print screen feature that prints any current text screen by depressing no more than three keys, not required during active testing sequences.

3.03 Display During Testing

During the emissions test, the word "**TESTING**" shall be displayed.

3.04 Messages Displayed During Testing

The analyzer shall display messages indicating if excessive exhaust dilution, low flow or out of range engine speed conditions occur during the test. If any of these conditions occur, testing shall be interrupted, the timer reset to the beginning of the current inspection mode (e.g., 2500 rpm, idle rpm, ASM1, or ASM2), and the testing not restarted until the condition has been corrected.

3.05 Information Not Permitted During Testing

The analyzer shall not display the emission readings during the emissions test.

3.06 Readability of Display

The display, when in the test mode, shall be readable at a distance of eight feet in a building, which meets OSHA lighting standards for a garage environment. Contrast shall be adjustable.

3.07 Engine RPM

The analyzer shall have the capability to display the engine speed up to four significant digits during the emissions test and any other information necessary for the operator to properly conduct a Georgia Emission Test inspection.

3.08 Test Results

(1) At the end of the emissions test, the display may show, as a minimum, the dilution corrected (and humidity corrected for NO) test results (and O2 if purchased):

HC : XXXX PPM
CO : XX.XX %
CO_2 : X.XX %
NO : XXXX PPM
O_2 : XX.X % (optional)

[Display 3.08(1)]

Programming Criteria:

When HC or NO readings are equal to or exceed 10,000ppm, the program shall display and store 9,999ppm. This will ensure that the PASS/FAIL logic will work during a retest since the GAS.DAT stores only a 4-digit number and readings this high cannot be trusted.

(2) Do not display CO_2 or O_2 readings on vehicles passing the emissions test. Only display the NO heading when the analyzer is equipped to perform NO testing and NO standards exist for the vehicle being tested.

3.09 Hard Disk Warning Message

When data is being stored or accessed, a message may be displayed indicating that the disk is in operation and the analyzer shall not be moved or otherwise disturbed. Following each disk read/write operation the hard disk read/write head shall be moved to a safe parked position.

3.10 Inspector Access

(1) Prior to starting a Georgia Emissions Test, the GAS shall determine if any lockouts are set. If no lockouts are set, the GAS shall request the inspector to enter his or her access code.

ENTER YOUR INSPECTOR ACCESS CODE.

[Display 3.10(1)]

(2) The inspector's access code shall not be displayed on the screen. Access to the emissions inspection sequence will only be achieved by successful entry of the access code. The GAS shall use the inspector's access code to lookup the corresponding inspector's license number (contained in TECH.DAT). The GAS will then store test inspector's license number in the corresponding field of the test record (GAS.DAT).

(3) The validity of the inspector's license number and access code will be determined by the VID (contained within RESPONSE.DAT) at the time the GAS makes contact with the VID. If contact is not made with the VID, the validity of the inspector's license number and access code will reside with the GAS.

Programming Criteria

(a) The inspector will be required to enter his or her Inspector Access Code only once.

(b) The VID shall populate TECH.DAT by transmitting the inspectors' license numbers, access codes, and expiration dates to the GAS. The GAS, upon receiving this information from the VID, shall read and store this information in the appropriate locations within TECH.DAT.

(c) The inspectors' licenses will have two alpha characters, followed by six numeric characters.

AAnnnnnn	Regular inspector license (ASM, TSI, OBD)
BAnnnnnn	New car only license (OBD / TSI)

(d) If the entered inspector's access code does not follow the five number format, the following message will be displayed:

YOUR ACCESS NUMBER IS NOT VALID - TRY AGAIN

[Display 3.10(2)]

(e) If an inspector enters an access code for an inspector license number that is not stored in the "Technician Information Table" of the GAS, the GAS shall display the following message:

THE INSPECTOR LICENSE NUMBER IS NOT IN THE GAS.
CONTACT THE HELP LINE. (1-800-449-AIR1)

[Display 3.10(3)]

(f) Whenever an inspector enters his/her access code, the GAS shall verify the license expiration date from the expiration date stored in the TECH.DAT file. If the inspector's license has expired, the GAS shall prohibit the inspector from performing a Georgia Emission Test inspection.

1. If an inspector whose license number has expired initiates a Georgia Emission

Test inspection, the GAS shall not allow performing the inspection and the GAS shall display the following message:

THE INSPECTOR LICENSE HAS EXPIRED.
YOU CANNOT PERFORM A GEORGIA EMISSION TEST.
CONTACT THE HELP LINE (1-800-449 AIR1)

[Display 3.10(4)]

2. The VID shall install a lockout for licenses that have been suspended or revoked. If an inspector that has been suspended or revoked initiates a Georgia Emission Test inspection, the GAS shall display the following message:

THE INSPECTOR LICENSE NUMBER HAS BEEN SUSPENDED OR REVOKED.

YOU CANNOT PERFORM A GEORGIA EMISSION TEST.
CONTACT THE HELP LINE. (1-800-449-AIR1)

[Display 3.10(5)]

3. Each inspector shall be issued an identification card containing his certificate number and access code.
4. An "M" shall be stored to indicate manual entry.

(4) An inspector who has a BA license, and is therefore only licensed to perform OBD/TSI tests, shall be precluded from testing older vehicles using ASM test procedures.

(5) Two determinations of the test type will be made: one at the beginning of the test sequence (immediately following entry of the vehicle model year), and a second immediately prior to the emissions test.

(a) If, during the first determination of test type, the GAS determines an ASM test is required but the inspector does not have an ASM license, the GAS will issue the following warning message:

ASM TESTING HAS BEEN DETERMINED.

YOU DO NOT HAVE THE PROPER LICENSE.

DO YOU WISH TO CONTINUE? Y/N

[Display 3.10(6)]

(b) If, during the second determination of test type, either the VID or the GAS determines an ASM test is required but the inspector does not have an ASM license, the GAS will issue the following message:

INSPECTOR IS NOT LICENSED TO PERFORM THE REQUIRED TEST.
THE GEORGIA EMISSION TEST IS ABORTED.

[Display 3.10(7)]

1. Such a test will be aborted prior to a test record being written. Therefore, no test record or VIR will be generated.

3.11 Model Year Entry and Test Sequence Determination

(1) The following sequences are to be used to determine the type of inspection sequence, based on model year.

(2) The GAS will prompt the inspector to enter the model year of the vehicle after the inspector's access code has been successfully entered (and accepted).

ENTER THE VEHICLE MODEL YEAR.

[Display 3.11(1)]

Programming Criteria

1. If no model year is entered, display:

NO NUMBER HAS BEEN ENTERED - TRY AGAIN

[Display 3.11(2)]

2. The GAS may require the inspector to enter all 4 model year digits, or it may default to first two digits to 19 or 20 and require the inspector to edit (as appropriate) the first two digits and enter the last two digits. If the GAS does not default the first two digits, and the inspector only enters the last two digits, display:

ENTER ONLY THE LAST TWO NUMBERS OF THE MODEL YEAR - TRY AGAIN

[Display 3.11(3)]

3. Model year entries past the current calendar year plus one, shall not be allowed (i.e.: in 2002, Model Year 2004 is not allowed). If the model year entered is newer than the allowed current year plus one, display,

MODEL YEAR IS NOT VALID - TRY AGAIN

[Display 3.11(4)]

4. The GAS shall check the MY of the vehicle entered and determine which test sequence is to be used. The appropriate inspection sequence shall be selected according to the model year of the vehicle.

(i) The rule is that if the vehicle is older than MY 1996 it shall be subjected to ASM test standards. All "newer" vehicles (MY 1996 and newer) receive an OBD test. Exceptions to this general rule are:

(I) If the MY entered is newer than the value found in the NEW YEAR EXEMPTION field of the PROGRAM.DAT the inspector shall be notified that the vehicle does not need testing. Vehicles newer than the value found in the NEW YEAR EXEMPTION field can only be inspected using reason "At Motorist's Request".

Display Prompt:
THIS VEHICLE DOES NOT NEED TO BE TESTED.

IF A TEST IS STILL DESIRED THE REASON: "NON-SCHEDULED INSPECTION AT MOTORIST'S REQUEST" SHALL BE SELECTED.

PRESS ENTER TO CONTINUE OR <ESC> TO ABORT.

[Display 3.11(5)]

ii If the MY entered is older than the value found in the field OLDEST VEHICLE TESTABLE of the PROGRAM.DAT then the vehicle shall not be subjected to an official Georgia I/M Test. The inspector shall be informed that the vehicle may only be tested in manual mode. The test shall be aborted at this point; no record shall be retained in the GAS.

Display Prompt:
THIS VEHICLE MAY NOT BE TESTED IN AN OFFICIAL TEST MODE. IF A TEST IS STILL DESIRED, USE MANUAL MODE.
PRESS ENTER TO ABORT.

[Display 3.11(6)]

iii vehicles with grandfather status (G or H) must be TSI tested, The GAS shall store a 4 (other) in the "REASON TSI TESTED" field of the GAS.DAT.

iv if the vehicle is of an age where it would be tested using ASM, the inspector shall be prompted:

DOES THIS VEHICLE HAVE FULL-TIME FOUR-WHEEL-DRIVE OR NON-DISENGAGEABLE TRACTION CONTROL THAT MAKES IT NOT ASM TESTABLE?

ENTER THE APPROPRIATE CODE:
(Number in front of selection is to be stored in the "REASON TSI TESTED field (45) of the GAS.DAT. This field shall have a default value of "0" indicating an ASM test was performed)

(1) **FULL-TIME FOUR WHEEL DRIVE**
(3) **TRACTION CONTROL**
(4) **OTHER**

[Display 3.11(7)]

If any of the codes are selected, the vehicle will be tested under the TSI procedure. The reason selected for the use of a TSI test will be stored in the Reason TSI Tested Field of the GAS.DAT file. Only the first code entered will be stored. The default TSI Reason Code will be zero (indicating the vehicle was not TSI tested). If there is a "T" in the "FORCE TEST TYPE " field of the VRT for the vehicle under test then the GAS shall populate the REASON TSI TESTED field with a "6" to indicate that the program forced the TSI test.

v the inspector will be allowed to override the ASM inspection by selecting “other”

vi At this point, a determination of whether the inspector is qualified to

perform an ASM or TSI test will be made. (See Section 3.10, Inspector Access, Programming Criteria)

vii The GAS shall evaluate the status of the "RANDOM TSI" flag in the PROGRAM.DAT file to determine if a TSI test is required after an OBD test.

3.12 Test Type Code and Retest Entry

(1) All tests shall be either an initial test (designated by an “I”), or an after-repairs test (designated by an “A”). All test performed within 90 days of a previous test shall be designated as an “A” test.

(2) The test type entry will be used in part to determine if the test is paid or free. For each paid test, the GAS will assign a new certificate number to the test record and remove it from the unit’s certificate register.

(3) All "I" tests are paid. For "A" tests, the GAS will determine if the test is a paid test, or if the inspector is to make a determination of whether the test is paid or free (the inspector makes this determination just prior to vehicle data edit screen). If no previous test data is found in the VID or GAS, the inspector will enter test type manually.

(4) If "A" is entered, the inspector will be prompted to enter the previous certificate number. If the test is free (as entered by the inspector), the previous certificate number will be reused and the test will be noted on the VIR and in the test record as a "RETEST". Retests will not require a new certificate number and thus will not count against the unit’s certificate register.

Programming Criteria

1. Entry of one of the codes is required. The analyzer software shall be designed so that only an “I” or “A” can be entered by the inspector for this field.

2. If the data returned from the VID, or if the VID call results in a No Match and the data stored in the analyzer indicates that the most recent was a failing test and has been performed within the last 91 days, this entry will automatically be entered as "A". The following message will be displayed:

THIS IS AN AFTER REPAIRS TEST. THE MOTORIST MUST PRESENT A COMPLETED REPAIR FORM TO OBTAIN A TEST.

IF NO REPAIR FORM IS AVAILABLE, PRESS "ESCAPE" TO ABORT THIS TEST.

PROCEEDING WITHOUT A COMPLETED REPAIR FORM MAY RESULT IN A VIOLATION OF THE REGULATIONS!

[Display 3.12(1)]

3. If “escape” is selected, the test will end and no record will be saved at this point in the inspection. The GAS will not permit an after-repairs inspection to be performed unless the inspector indicates repair form data will be entered.

(5) If this is a free retest, the certificate number from the previous paid test will be used. An initial test will be assigned a new certificate number. Certificate numbers will be assigned at the conclusion of a test. In order to avoid problems with lost certificates if a test is terminated part way through, the certificate number assignment will be made as the last action prior to writing the final, end-of-test record. Aborted tests will not be assigned a certificate number, or count as a free retest. Abort codes 01-09 result in a FAILED test, and are to be treated in the same manner as any other failed test, e.g., a certificate number is assigned for a paid test. Other abort codes result in an ABORTED test and no certificate number is assigned. (See Section 3.35, Test Fee Entry)

ENTER TEST TYPE CODE:
SELECT THE APPROPRIATE TEST TYPE CODE FROM THE LIST BELOW

CODE	TEST TYPE
I	**INITIAL INSPECTION**
A	**AFTER REPAIRS TEST**

[Display 3.12(2)]

(6) If "I" is selected and not subsequently changed to "A", this is a paid test. If "A" is selected or obtained from the VID, display the "repair form required" message above. The previous certificate number will be reused if this is a free retest. If it is a paid test, a new certificate number will be assigned.

1. If this is an initial test or paid retest, a new certificate number will be assigned at the conclusion of the test.

2. Previous test results, obtained from either the VID or GAS, will be used to determine which portion of the test shall be performed. Portions of the test that have been passed previously will not have to be repeated if obtained from the VID or GAS.

3. After the Test Type prompt, if "I" (for Initial Inspection) is selected, the GAS shall display the following prompt:

WHY IS THE VEHICLE BEING INSPECTED?
(ENTER ONE OF THE FOLLOWING NUMBERS.)
(Value stored in field 36 "Inspection Reason" is shown in parenthesis in front of selection)

(4) **ANNUAL INSPECTION** {DEFAULT}
(2) **INITIAL REGISTRATION (OUT OF STATE)**
(3) **SALE /TRANSFER INTO I/M AREA**
(5) **TO CORRECT VEHICLE DESCRIPTION ERROR ON PREVIOUS TEST**
(6) **NON-SCHEDULED INSPECTION AT MOTORIST'S REQUEST**

[Display 3.12(3)]

(i) If either option (5) or (6) is selected, the GAS will automatically select the test type as "I" and ignore any previous test results that may be handed down by the VID. If option (5) is selected, a new inspection certificate number must be issued. The new certificate will be issued at no charge to the customer but will result in a charge to the inspection station. The GAS shall store a "Y" in the "PAID TEST" field 38 of the GAS.DAT.

(ii) If option (6) is selected, a new inspection certificate number must be issued, but in this case, the customer will pay the inspection fee. If option (6) is selected, vehicles less than the current exempted model years old will not be rejected from testing

(i.e. in test year 2002: MY 2000, 2001 and 2002 vehicles).

(iii) If an option 5 or 6 test resulted in a “failure", the vehicle is to be repaired and returned for an after-repairs test. For the after-repairs test, the inspector would enter the certificate number and the GAS would attempt to find the previous valid inspection from the VID FIRST or GAS SECOND. If a previous record is found, the VID or GAS will pass the inspection reason (5 or 6) from the previous test back to the new GAS.DAT. If either an inspection reason 5 or 6 is passed back to the GAS.DAT, the GAS is to write a 4 (“ANNUAL”) to the "inspection reason" field of the current GAS.DAT record.

(iv) The inspector's entry shall be stored in the, INSPECTION REASON field (36) of the GAS.DAT.

Error Messages:
NO VALUE HAS BEEN ENTERED - TRY AGAIN

[Display 3.12(4)]

TEST TYPE CODE IS NOT VALID - TRY AGAIN

[Display 3.12(5)]

(v) If "I" is entered, the inspection will proceed to initial regular vehicle data entry (Section 3.11, Model Year Entry and Test Procedure Determination)

(7) If the inspection is after repairs, enter the previous inspection certificate number.

(a) If "A" is entered, the inspector will enter the previous certificate number. The certificate number must be in the correct format (2 alpha, 6 numeric). The GAS shall check the entered "previous certificate number" to be sure that only a number consisting of two letters and six numbers was entered.

ENTER THE PREVIOUS CERTIFICATE NUMBER.

[Display 3.12(6)]

Error Message:

THE CERTIFICATE NUMBER IS NOT VALID.

[Display 3.12(7)]

(8) After a valid certificate number is entered, a call will be made to the VID.

(a) If no match is found and no record is found in the GAS, the inspector will be prompted to proceed with VIN/License entry (Section 3.13, VIN/License Plate Entry).

NO INSPECTION DATA WAS FOUND.
PROCEED WITH MANUAL DATA ENTRY.

[Display 3.12(8)]

(b) If a match is found, the VIN, LIC, vehicle data, previous test data, and date will be displayed the inspector shall be given the opportunity to make corrections. No changes will be allowed to the VIN. If the VIN is incorrect, the inspector will be prompted to proceed with manual data entry.

CHECK VEHICLE DATA AND MAKE ALL CHANGES AS NEEDED, THEN

PRESS "ENTER".

NO CHANGES ARE ALLOWED TO VIN.

IF THE VIN IS NOT CORRECT, PRESS "M" AND PROCEED TO MANUAL ENTRY.

IF THE CERTIFICATE NUMBER OR OTHER TEST DATA DISPLAYED DO NOT MATCH THE DATA ON THE VIR USE THE DATA FROM THE PREVIOUS TEST.

[Display 3.12(9)]

(9) After any changes are made (except to VIN), the inspection will proceed. If this test is entered as a free retest, the test will use the final entered certificate number with a "retest" identifier. If it is entered as a paid test, a new certificate number will be assigned.

(10) A flag to identify paid test will be passed from the VID to the GAS in the RESPONSE.DAT file. The flag will also identify if the test is thought to be a free test or if the VID does not contain sufficient information to make a determination.

(11) The GAS is to interpret a “P” flag as a paid test. Both the “F” flag and the “U” flags are to be interpreted as “not a P flag".

3.13 VIN/License Plate Entry

(1) VIN entry shall be the primary vehicle identification for all initial tests and for those after-repair tests in which no match can be found for the previous certificate number in either the VID or the GAS.

(2) The following display prompts can be displayed on one screen with the ability to scroll through the list and select the appropriate option. Alternatives to the following VIN and license plate entry criteria may be submitted and are subject to EPD's approval.

ENTER VIN

ENTER LICENSE PLATE NUMBER

ENTER LICENSE PLATE STATE

IF THE VEHICLE HAS NO LICENSE PLATE
PRESS <F Key>

[Display 3.13(1)]

Programming Criteria

(a) If the vehicle has no license plate, the GAS shall allow the inspector to enter "NONE". The GAS shall store "NONE" (in the license plate field) in the vehicle test record and print "NONE" on the vehicle inspection report. For such vehicles, the "State" entry will default to Georgia (GA).

1. If less than three characters are entered the inspector shall be prompted to verify

the license plate and correct the entry, or proceed.

2. The GAS shall have a function key or other method to enter the word "NONE" for a tag number. If the inspector presses the function key to indicate NONE, the GAS shall automatically enter "Ga" as the state and proceed to the next screen. The program shall skip the "enter state screen" since the default is Ga.

TOO FEW CHARACTERS WERE ENTERED FOR THE LICENSE PLATE. IF THERE IS NO PLATE PRESS <F Key>, OR PRESS <ENTER> TO ACCEPT

[Display 3.13(2)]

(b) The GAS shall allow both VIN and License Plate to be entered manually.

(c) If the vehicle has an "Out –of -State" license plate, the GAS shall allow the inspector to manually enter the VIN first and license plate number or select the appropriate "Issuing State" from the list and then enter the license plate number.

IF THE VEHICLE HAS AN "OUT-OF-STATE" LICENSE PLATE, ENTER THE VIN AND LICENSE PLATE NUMBER, SELECT THE "ISSUING STATE" FROM THE LIST.

[Display 3.13(3)]

(d) If the vehicle has an "Out-of-State" License plate:

1. The GAS shall display a list containing the names of the 50 States and District of Columbia, Puerto Rico, Guam, American Samoa, Mexico, Canada, Federal Government Plate, Other, and the inspector shall be allowed (by scrolling through the list) to select one that applies for the vehicle under test and enter it into the GAS. The GAS shall display the following message:

SELECT AND ENTER THE "ISSUING STATE" OF THE LICENSE PLATE FOLLOWED BY THE LICENSE PLATE NUMBER.

[Display 3.13(10)]

2. The GAS shall default to "Georgia".

3. "Issuing State" shall be entered by a method, approved by the State, which maximizes user friendliness; preferably in the same way as vehicle make names are currently selected and entered into the GAS. After the VIN and license plate number have been entered, the GAS shall allow the inspector to select and enter the "Issuing State" "Out-of-State" license plate number

4. The GAS shall store "Out-of-State" in the License Plate Number field. The "Issuing State" abbreviation shall be recorded in the License Plate Issuing State field of the vehicle test record. The abbreviation shall be the standard two-alpha character State or District of Columbia or the country abbreviation used by the U.S. Post Office (see Appendix-E for abbreviations). The GAS shall print the license plate and "Issuing State" (full name) of the license plate on the VIR.

(e) The GAS shall automatically store the source of entry for both VIN (VIN

Input Source) and license plate number (License Plate Input Source) in the GAS.DAT as follows:

1. For VIN INPUT SOURCE

   "V" = Bar code on vehicle
   "M" = Manual entry

2. For vehicle LICENSE PLATE INPUT SOURCE:

   "D" = Bar code on DOR registration document
   "M" = Manual entry

3. If the VIN and license plate number are retrieved from a previous test record from the VID or internally (due to after-repairs test entry of certificate number), the VIN and plate source will be left blank.

(f) For VIN entry:

1. The GAS shall verify the VIN check digit for all GAS entered VINs and will require the VID to maintain a record that the GAS entered VIN is valid. This information is stored in the field #10 VIN CHECK DIGIT FLAG of the GAS.DAT.

2. The GAS shall screen for potentially invalid VIN characters on 1981 and newer MY vehicles. If the inspector enters "I", "O" or "Q" in the VIN, the GAS shall display the following message:

THE LETTERS "I", "O" and "Q" ARE NOT VALID ENTRIES FOR 1981 AND LATER VINs.
CHECK AND RE-ENTER THE VIN.

[Display 3.13(4)]

3. If an inspector has entered one of these invalid characters and the vehicle model year is entered as MY 1981 or newer, the inspector shall be given an opportunity to edit the VIN. If the inspector chooses not to reenter the VIN, the inspector will be permitted to continue with the test.

   (i) If the VIN is not corrected, an "N" shall be written to the VIN CHECK DIGIT FLAG field of the GAS.DAT.
   (ii) If the VIN is reentered and the check digit matches, the check digit flag shall be reset to "Y" in the VIN CHECK DIGIT FLAG field of the GAS.DAT.

4. The GAS shall allow unlimited reentry of the VIN.

5. The format for Vehicle Identification Numbers (VINs) is contained in the Federal Motor Vehicle Safety Standards (FMVSS) section 115. All:

   - Passenger cars,
   - Multipurpose passenger vehicles with gross vehicle weight ratings of 10,000 lbs or less, and
   - Trucks with gross vehicle weight ratings of 10,000 lbs or less manufactured after September 1, 1980, comply with this standard.

Gray market and kit cars may not conform to this standard.

6. Calculation of VIN Check Digit

The check digit occupies the 9th position in the VIN. The check digit's value is determined by assigning each number in the VIN its actual mathematical value and assigning to each letter the value specified in the following chart:

Letter	Mathematical Value
A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
J	1
K	2
L	3
M	4
N	5
P	7
R	9
S	2
T	3
U	4
V	5
W	6
X	7
Y	8
Z	9

(i) Multiply the assigned mathematical value for each character in the VIN by the weight factor assigned to the position occupied by the character (see following table). The weight factor for the 9th position (i.e., the check digit) is "0".

Position	Weight
1st	8
2nd	7
3rd	6
4th	5
5th	4
6th	3
7th	2
8th	10
9th	0
10th	9
11th	8
12th	7
13th	6
14th	5
15th	4
16th	3

17th 2

(ii) Add the resulting products and divide the total by 11.

(iii) The remainder is the check digit. If the remainder is 10, the check digit is "X"

Example:

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
VIN Character	1	G	4	A	H	5	9	H	4	5	G	1	1	8	3	4	1
Assigned Value	1	7	4	1	8	5	9	8	4	5	7	1	1	8	3	4	1
Weight Factor	8	7	6	5	4	3	2	10	0	9	8	7	6	5	4	3	2
Add Products	8	49	24	5	32	15	18	80	0	45	56	7	6	40	12	12	2
Divide by 11	Sum of Products = 411; Divide by 11 = 37 4/11																
Check Digit	4 (compare this to character in 9th position)																

(iv) If the check digit is not valid, the GAS will display a check bit error warning.

CHECK DIGIT IS NOT VALID
DO YOU WISH TO EDIT THE VIN Y/N

[Display 3.13(5)]

7. If the inspector reenters the VIN and the check-digit is now valid, the flag shall be reset to indicate a valid check-digit.

   The VIN may be re-entered either by retyping the entire VIN or by correcting any invalid entries. If the suspect characters are re-entered for a 1980 or older model vehicle, they will be presumed correct and the data entry process will continue.

8. The GAS shall validate the model year entered after the inspector's access code matches the model year encoded in the VIN. The 10th character of the VIN represents the model year (see following table)

Year	Code		
1980	A	1992	N
1981	B	1993	P
1982	C	1994	R
1983	D	1995	S
1984	E	1996	T
1985	F	1997	V
1986	G	1998	W
1987	H	1999	X
1988	J	2000	Y
1989	K	2001	1
1990	L	2002	2
1991	M	2003	3
		2004	4

2005	5	2009	9
2006	6	2010	A
2007	7	2011	B
2008	8	2012	C

9. If the model year in the VIN does not match the inspector entered model year, the GAS shall display:

VIN INDICATES MODEL YEAR IS XXXX, IS THIS CORRECT? Y/N

[Display 3.13(6)]

(i) The inspector shall be given an opportunity to correct the model year, but may proceed without making the change.

(ii) If the inspector changes the model year, the test type will be recalculated. If the test type changes, the appropriate prompts will be displayed.

10. For 1981 and later model year vehicles, if fewer than 17 characters are entered (or scanned), the GAS shall display the following message:

THE VIN ENTERED HAS FEWER THAN 17 CHARACTERS.
VERIFY THAT THE VIN ENTERED MATCHES THE VEHICLE'S ACTUAL VIN.

[Display 3.13(7)]

11. A few older vehicles may have a VIN that exceeds 17 characters. If more than 17 characters are entered, the GAS shall display the following message:

THE VIN ENTERED EXCEEDS 17 CHARACTERS.
CHECK THE VEHICLE REGISTRATION AGAINST
THE ACTUAL VIN AND ENTER THE CORRECT VIN.
ENTER THE LAST 17 CHARACTERS OF THE VIN

[Display 3.13(8)]

12. Depending upon the VIN entry attempt, the GAS shall display one of the following messages:

NO VALUE HAS BEEN ENTERED
AT LEAST 3 CHARACTERS MUST BE ENTERED -
TRY AGAIN.

[Display 3.13(9)]

(g) For an after-repairs test, if the VIN sent down by the VID (in response to a Cert Num enquiry) is wrong, the inspector must end the after-repairs test and re-enter the VIN as an initial test. This could happen if the initial test was completed with an incorrectly entered VIN.

(3) Network Communications

(a) Access Security Algorithm: The GAS shall attempt the initial network contact immediately after entering the VIN and license plate number or previous certificate number of the vehicle to be inspected. Contact shall be attempted for EVERY

Georgia Emission Test. Upon entry of the VIN and vehicle license plate number or previous certificate number the GAS shall automatically initiate a call to the network.

PERFORMING NETWORK ACCESS, PLEASE WAIT.

[Display 3.13(11)]

(b) Collection of VID Communications Data (see Appendix D)
All phone call activities including multiple phone calls shall be handled by the communication software in accordance with the" GAS Communications Interface to VID For Georgia I/M Program Phase III, Functional Specification No. ESP-SP10019 or newer. The GAS shall make the telephone call and wait for a response bit from the VID. If after 45 seconds the GAS doesn't receive a response bit from the VID, the GAS shall hang-up and redial. The ET vendor software shall make two (2) phone call attempts to connect to the VID. If network communications have not been achieved, the GAS shall proceed with the Georgia Emission Test inspection without connecting to the VID. At the end of a second unsuccessful attempt, the GAS shall display the following prompt:

CANNOT ACCESS THE NETWORK, PROCEED WITH THE GEORGIA EMISSION TEST.

[Display 3.13(12)]

Programming Criteria

1. In such an event, the GAS shall proceed in the same manner as if a "No Match" message has been received following the second network access call. The GAS shall enable the inspector to enter the vehicle information (Year, Make, Model, Engine Size, etc.) into the GAS. The GAS shall default to the local "GAS-resident" VRT, ESC table, etc. and shall proceed with the Georgia Emission Test.

   NOTE: Manufacturers may allow the inspector to re-dial the VID to attempt to download the previous cert information or to retrieve a known Grandfather status for a vehicle. This may be accomplished by the use of a <F Key> after the failed attempt to communicate. A possible display would read:

   PRESS <F Key> TO RETRY VID CONTACT OR ENTER TO PROCEED.

   [Display 3.13(12a)]

2. Each GAS unit will be allotted a certain number of Georgia Emission Tests that can be performed without being transmitted to the VID being transmitted to the VID over a time-period. Both the number of tests not transmitted and the number of hours over a time-period. Both the number of tests not transmitted and the number of hours over which they are allotted will be set through the VID. For most stations, the allowance will be 50 or 168 hours from the oldest stored test not transmitted and this will be the default setting for station start-up. High volume stations (in excess of 500 inspections per month) will be allowed the same as mobile testers. Mobile test systems will be allowed 250 tests or 72 hours from the oldest stored test not transmitted. Stations may apply for different limits based upon a demonstrated need. Every test for which a record is

generated, including aborts, will count toward the running test total.

3. When the limit on the number of non-transmitted tests or the specified time-period is exceeded, the GAS shall set a lockout and therefore prevent additional Georgia Emission Tests. In this event, the GAS shall display the following message:

THE GAS IS LOCKED OUT OF GEORGIA EMISSION TESTING.

THE GAS HAS PERFORMED GEORGIA EMISSION TESTS WITHOUT TRANSMITTING THEM TO THE VID. PERFORM A DATA FILE REFRESH or TRANSMIT TEST DATA FUNCTION BEFORE CONTACTING THE HELP LINE.

[Display 3.13(13)]

(4) Network Security

(a) If security log in fails, and ANI security validation is rejected, the GAS shall display the following message:

COMMUNICATION SECURITY VIOLATION.

[Display 3.13(14)]

INVALID GAS UNIT PHONE NUMBER.

[Display 3.13(15)]

CHECK TO BE SURE THAT THE GAS IS PLUGGED INTO THE CORRECT PHONE LINE.

[Display 3.13(16)]

MAKE THE NECESSARY CORRECTIONS AND PRESS A <Function Key> TO CONNECT TO THE VID.

[Display 3.13(17)]

(b) The GAS shall allow the inspector to make the necessary corrections (i.e. plug the GAS into the correct phone line) and attempt to connect to the VID by pressing a Function Key. If the GAS still fails the security log in and ANI security validation is rejected, the GAS shall not allow the Georgia Emission Test inspection to proceed. The GAS shall display the following message:

COMMUNICATION SECURITY VIOLATION.

[Display 3.13(18)]

INVALID GAS UNIT PHONE NUMBER.

[Display 3.13(19)]

CHECK TO BE SURE THAT THE GAS IS PLUGGED INTO THE CORRECT PHONE LINE.

[Display 3.13(20)]

THE INSPECTION CANNOT PROCEED. CONTACT THE NETWORK "HELP DESK."

[Display 3.13(21)]

(c) The ANI security validation failure shall be "self-correcting", if the GAS is plugged into the correct phone line.

(d) If security login fails due to a "TOKEN" violation, the VID shall send the following message to the GAS: The GAS shall display the following message:

COMMUNICATION SECURITY VIOLATION.

[Display 3.13(22)]

INCORRECT IDENTIFICATION.

[Display 3.13(23)]

CONTACT THE NETWORK "HELP DESK" IF THIS PROBLEM PERSISTS.

[Display 3.13(24)]

(e) The inspector will note the violation and continue the test.

(5) Initiated Actions

(a) After connecting to the VID network, the GAS shall transmit the following data:

- VIN/License plate number
- Test records
- Calibration records, if applicable
- Request Current Lockout Status
- VRT version date
- Certificate Status Report request, if applicable
- VID communication data

(b) The GAS shall automatically transmit the software version number at the beginning of each communication session to the VID.

1. Transmit VIN or Transmit Certificate number

The GAS shall display the following message:

SEARCHING FOR VEHICLE INFORMATION, PLEASE WAIT.

[Display 3.13(25)]

Programming Criteria

1. If a vehicle match is found, the VID shall transmit to the GAS applicable information for the vehicle under test, in addition to any other pending transactions.

   For a vehicle undergoing a Georgia Emission Test inspection once a match has been made and the vehicle inspection data or failed test data has been transferred from the VID to the GAS unit the GAS shall not allow changes or corrections either to the VIN or license plate number. If changes or corrections have to be made, the test shall be aborted and a new test may be started by entering the correct VIN and license plate number. If VIN or license is incorrect in data returned after a certificate number entry, the test cannot be continued. The inspector must abort the test and restart the test sequence as an initial test.

2. If "No Match" is found on the first attempt (note: as counted by the GAS) for a Georgia-licensed vehicle, then the GAS shall prompt the inspector as follows: This message will not be displayed and the test will proceed if two VID calls have already been made, either one on certificate number and one on VIN/license, or two on VIN/license, or it is an out-of-state licensed vehicle.

NO VEHICLE MATCH HAS BEEN FOUND. VERIFY THAT THE VIN AND LICENSE PLATE HAVE BEEN ENTERED CORRECTLY. MAKE ANY

NECESSARY CHANGES AND PRESS F3 TO PROCEED.

[Display 3.13(26)]

3. The GAS shall allow the inspector to make changes to the VIN and/or vehicle license plate number, and after such changes the GAS shall prompt the inspector to press a "F3" to initiate a second call to the VID. If no changes are made, the "F3" key shall cause the test to proceed directly to manual entry.

4. If "No Match" is found after two total attempts, then the GAS shall proceed with the Georgia Emission Test inspection in accordance with the "No Match" criteria. The GAS must be able to differentiate between the first and the second "No Match" message. The GAS shall display the following message:

NO MATCH HAS BEEN FOUND. PLEASE PROCEED WITH THE GEORGIA EMISSION TEST.

[Display 3.13(27)]

5. If a "No Match" message occurs, the GAS shall enable the inspector to enter the test vehicle's (Year, Make, Model, Engine Size, etc.) into the GAS. The GAS shall default to the local "GAS-resident VRT, etc." and shall proceed with the Georgia Emission Test.

6. The GAS shall determine whether the vehicle under test is an "Out-of-State" vehicle prior to initiating a follow-up call where a "No Match" message has been received. If the GAS determines that the vehicle is an "Out-of-State" vehicle, then the GAS shall not initiate a second call.

7. The GAS shall display a message alerting the inspector of his/her responsibility to advise the consumer that "No Match" was made with the DOR record and that the consumer should retain the VIR for reference during the registration process.

(6) Network Responses

As the low level communication interface protocol makes contact with the network and establishes a session, the network will respond with stored transaction and messages (appropriate response bits) that are waiting for transmission to the GAS. These messages are listed below. The automatic transaction and message updates will occur on every session initiated by the GAS except during communications system test transaction. The communications interface will provide the GAS application with the appropriate status information to determine which transactions have occurred following network session initiation.

- Receive Vehicle Data
- Receive Failed Test Data with VIN and License Plate Number
- Receive Recall Information
- Receive Emissions Standards Category (ESC) Tables
- Receive Updates to the Vehicle Reference Table (VRT)
- Receive Default VRT (VRTDF) Table
- Receive System Date/Time Update
- Receive Lockout Status
- Receive Inspector Data
- Receive Certificate Numbers
- Receive EPD Messages

- Receive Communications Transaction
- Received Maximum Program Fees (PROGRAM.DAT)
- Received Random TSI (PROGRAM.DAT)
- Received Updates to ESC_ASM.DAT table
- Received Horsepower Default Table (HP_DFLT.DAT).

(7) Receive Vehicle Data

(a) The following vehicle data in the proper test record format, if available, shall be transmitted by the VID to the GAS and shall overwrite existing vehicle data in the GAS test record. The programming criteria outlined in Section 3.1 shall then be reapplied. This data is to be verified and confirmed/changed by the inspector on the vehicle data review screen.

- VEHICLE MODEL YEAR
- VEHICLE STANDARDS TYPE
- VEHICLE BODY TYPE
- INSPECTION REASON
- GVWR
- VEHICLE MAKE
- VEHICLE MODEL NAME
- NUMBER OF CYLINDERS
- ENGINE SIZE (IN CUBIC CM.)
- TRANSMISSION TYPE
- FUEL TYPE
- PREVIOUS FAILED TEST RESULTS (IF APPLICABLE)
- PREVIOUS ODOMETER READING (IF AVAILABLE)
- VRT ROW ID NUMBER (IF AVAILABLE)
- VID ID

(b) The following vehicle data shall have to be entered during each Georgia Emission Test as applicable:

- ODOMETER READING
- TEST TYPE

(c) Receive Failed Test Data with VIN and License Plate Number

1. Failed vehicle test results from the previous Georgia Emission Test inspection (in accordance with Section 4.1 "Vehicle Test Record Format") within the past 91 days, if applicable, shall be transmitted by the VID to the GAS, or found on the GAS if no contact was made with the VID and shall be displayed to the inspector. The GAS shall display the following selected failed test result information relative to a vehicle that has failed a previous Georgia Emission Test inspection on the screen and shall provide an option to print.

PREVIOUS CERTIFICATE NUMBER	**AANNNNNN**
DATE OF PREVIOUS TEST	**MMDDYYYY**
FAILED TAMPERING INSPECTION	**YES/NO**
FAILED OBD or TAILPIPE EMISSIONS	**YES/NO**
FAILED FUNCTIONAL CHECKS	**YES/NO**

[Display 3.13(28)]

2. The test type should be automatically set default to "After Repairs" since failed data was found. This change to the test type will be made only after the inspector has had an opportunity to correct the vehicle VIN. At this point the warning message 3.12(1), "This is an after repairs test..." shall be displayed and the inspector will be instructed to abort the test if no repair form has been presented. If an "I" test has been changed to an "A" test because previous test data was returned, the inspector shall not be required to verify and shall not be allowed to alter the information.

3. If the previous test data shows all “NO” results (i.e., the vehicle passed all portions of the previous test), then the GAS shall display the following message:

NO ADDITIONAL TESTS REQUIRED.

[Display 3.13(29)]

4. The GAS shall end the test without creating a test record and without printing an inspection report.

5. If no previous test data is returned for a test that has been entered as an "A", the following screen shall be displayed and the inspector shall enter test data from the previous VIR. This display shall only be viewed for a test which was entered initially as an "A", but for which a match was not obtained based on the certificate number or a subsequent VIN/License entry.

ENTER RESULTS FROM THE VIR OF THE MOST RECENT FAILED INSPECTION

WARNING: ENTERING FALSE DATA HERE WILL RESULT IN REVOCATION OF YOUR INSPECTOR LICENSE.

DATE OF PREVIOUS TEST	
FUNCTIONAL TEST- FUEL CAP	**P/F**
OBD or EMISSION TEST	**P/F**
VISUAL-CATALYTIC CONVERTER	**P/F**

[Display 3.13(30)]

If "F" was not entered for any of these three, the inspector shall have the option of modifying the response or exiting the test with no test record written.

(8) Receive Recall Information

(a) Emissions related recall information, if available from the vendor, shall be transmitted to the GAS from the VID for use during the Georgia Emission Test inspection. The initial information that will appear on the GAS screen will be the pertinent vehicle information as provided by the VID. The inspector shall review this information to ensure its accuracy. If manufacturer issued emission-related recall information is transmitted by the VID, the GAS shall display the emission-related recall information in the following format at the conclusion of the inspection, i.e., prior to the printing of the VIR:

Example:

**** EMISSIONS RECALL ****

Model Year: 1982 Engine Family: FAD1.6V6FBC2
Make: AUDI Recall Initiated: 06/01/90
Engine Size: 1.6L Recall #: GL
Model: 4000 Source: MFG/CARB
Class: PC

Affected Vehicles:
ALL

Defects: AIR/FUEL CHECKING PROCEDURES ON EMISSION LABEL ARE NOT CONSISTENT WITH INSTRUCTIONS IN THE REPAIR MANUAL.

Fix:
REPLACE LABEL. NEW LABEL SHOULD BE WHITE WITH BLACK LETTERS AND SHOULD NOT HAVE AIR/FUEL MIXTURE CHECKING PROCEDURE.

(b) For vehicles that fail the emission inspection, a summary of the recall information consisting of the first line (beginning with "*&", no quotes) of the recall message, may be printed. The GAS shall provide the option to print the complete text of the emissions recall information.

(9) Receive Emissions Standards Category (ESC) Tables
The GAS shall receive the entire ESC Tables (not individual records) if applicable, from the VID for use during a Georgia Emission Test inspection. If the GAS receives ESC Tables, the ESC Tables shall remain in use by the GAS until a subsequent version is received.

NOTE: It is anticipated that this table shall not be frequently changed and/or updated.

(10) Receive Updates to the Vehicle Reference Table (VRT) and Default VRT. Description of update procedure contained in Section 1.11, Vehicle Reference Table (VRT).

(11) Receive System Date/Time Update: The communication software resets the current GAS date/time settings only when the GAS transmits the VIN and license plate number information to the VID. The VID shall pass via the communication software the current date/time settings to the GAS. The communications software shall not update the DOS clock during "End-of-Test" contact (passing smog inspection results) or "communications system test" session. The communication interface program shall set a response status bit in the response status words notifying the GAS that the DOS clock has been reset. If the GAS uses other clocks (not a DOS based clock), the GAS shall be required to update the appropriate other system clock. The inspection start date and time stamp for a smog inspection shall be set in the test record following the receipt of the system date/time update by the GAS just after the initial network contact. If communications attempts fail for the initial network contact, the date and time stamp shall be set using the appropriate GAS system clock settings.

(12) Receive Lockout Status: The status (on/off) of the State installed lockouts shall be transmitted by the VID to the GAS. If a lockout(s) is set, then ~~subsequent~~ Georgia Emission Tests shall be prohibited until the applicable lockout(s) has been cleared. The VID shall return the state of the following lockout conditions to the GAS:

1. QA/STATE GAS LOCKOUT

2. QA/STATE ASM LOCKOUT
3. CABINET TAMPERING
4. STATE DISK DRIVE TAMPERING
5. CERTIFICATE AREA TAMPERING
6. STATION LICENSE SUSPENDED
7. STATION LICENSE REVOKED
8. STATION LICENSE EXPIRED
9. FAILURE TO PAY FOR CERTIFICATES PURCHASED
10. FAILURE TO PAY FOR COMMUNICATION SERVICES
11. X NON-TRANSMITTED INSPECTIONS CONDUCTED IN Y HOURS WITHOUT VID CONTACT
12. VRT CORRUPT
13. ESC_ASM.DAT CORRUPT

(a) If a lockout has been set, then the GAS shall display one or more of the messages shown below:

THE GEORGIA EMISSION TEST WILL BE ABORTED DUE TO A QA/STATE INSTALLED LOCKOUT BEING SET.

CONTACT HELP LINE FOR FURTHER INSTRUCTIONS.

[Display 3.13(31)]

THE GEORGIA EMISSION TEST WILL BE ABORTED SINCE STATION LICENSE HAS EXPIRED.

CONTACT HELP LINE FOR FURTHER INSTRUCTIONS.

[Display 3.13(32)]

THE GEORGIA EMISSION TEST WILL BE ABORTED SINCE STATION LICENSE HAS BEEN REVOKED OR SUSPENDED.

CONTACT HELP LINE FOR FURTHER INSTRUCTIONS.

[Display 3.13(33)]

THE GEORGIA EMISSION TEST WILL BE ABORTED SINCE A LOCKOUT HAS BEEN SET DUE TO FAILURE TO PAY FOR CERTIFICATE NUMBERS PURCHASED.

CONTACT HELP LINE FOR FURTHER INSTRUCTIONS.

[Display 3.13(34)]

THE EMISSION STANDARDS DATABASE IS CORRUPT, CALL SERVICE

[Display 3.13(34a)]

NOTE: Messages or indication for lockout items 3, 4, 5 are manufacturer specific. The message for item 12 is found at [Display 3.13(13)], and for item 13 found at [Display 3.01(9)].

(13) Receive Inspector(s) Data

(a) When a technician table is updated, the complete updated technician table shall be transmitted by the VID to the GAS. The GAS software shall not allow changes to the

"Technician Information File" from the analyzer. Inspector information can only be changed from the VID. Upon receiving the inspector information from the VID, the GAS software shall not be required to validate the inspector information received from the VID.

Directory/File Name: C:\GASDATA\TECH.REC

(b) Upon receiving data from the VID, if the inspector's license number that is performing the Georgia Emission Test has been deleted, the GAS shall allow the inspector to complete the Georgia Emission Test inspection. However, after the Georgia Emission Test inspection has been completed the GAS shall display the following message:

THE INSPECTOR LICENSE NUMBERS AND ACCESS CODES HAVE BEEN UPDATED BY THE VID. PLEASE CHECK AND IF THERE ARE PROBLEMS. CONTACT THE HELP LINE.

[Display 3.13(35)]

(c) The GAS shall display the updated list of inspector license numbers and access codes and shall provide an option to print the list if desired. During screen display or printing of the inspector information the GAS shall not display the actual inspector access codes (hidden) so that unauthorized person(s) may not view them.

(14) Receive Certificate Numbers: Certificate numbers, if available, shall be transmitted for use during subsequent Georgia Emission Tests. The numbers shall be received in multiples of 50 (50 per record) and shall be stored in the certificate inventory until needed.

The GAS shall display a "Certificate Received" message and shall print a receipt as shown below:

ELECTRONIC CERTIFICATE NUMBER PURCHASE RECEIPT

DATE: MMDDYYYY TIME: HH:MM
STATION: STATION LICENSE #
GAS ID: GAS LICENSE #

CERTIFICATE NUMBERS HAVE BEEN ISSUED TO THIS STATION VIA ELECTRONIC TRANSFER.

CERT. RANGE	TOTAL CERT.	COST/CERT.	TOTAL COST
AA000001-AA000050	50	$6.95	$347.50

[Display 3.13(36)]

Note: List each range of fifty (50) certificates.

(15) Receive EPD GAS Messages: EPD GAS messages shall be transmitted by the VID to the GAS. All EPD GAS messages will be in a text file format and shall be displayed if messages are received during Georgia Emission Test. The GAS shall display these messages on the screen and shall provide an option to print. Once these GAS messages have been displayed and / or printed, the GAS shall store the last 100 GAS messages received. These GAS messages shall be able to be recalled by the station manger or inspector and printed individually.

(16) Receive Communications Transaction: The communications data stream, as received from the network, shall contain the command response status such as "No Match",

"Previous Failed Test Result", etc. Data that may be received by the GAS, in addition to the aforementioned, is defined in subsequent sections.

If, as result of the VID response, the vehicle is identified as having a "Previous Failed Test Result", the GAS shall alert the inspector of the failed test results.

For the following data entries, the inspector shall have the option of accepting the data received through the VID, modifying the data, or manually entering the data if no match occurs.

(17) Received Maximum Program Fees (PROGRAM.DAT)

(18) Received Updates to ESC_ASM.DAT Table

(19) Received Horsepower Default Table (HP_DFLT.DAT)

(20) Paid Test Determination

(a) The last entry prior to continuing with entry of vehicle information is the test fee.

(b) If the test type is entered as an "I", the fee will automatically be entered as paid ("Y").

(c) If the previous test was performed more than 30 days but less than 91 days from the current (re) test date, the test fee will default to “paid”. If the previous test was performed less than 31 days from the current test date, the inspector will be asked to determine if the test is free or paid.

(d) For a test begun as an after-repairs test, if the previous test was performed more than 90 days from the current (re) test date, display:

MORE THAN 90 DAYS SINCE LAST TEST
PERFORM TEST AS INITIAL TEST

[Display 3.13(38)]

End the test. The inspector will have to restart the test sequence, from "Enter Access Code", as an initial test.

(e) The VID will pass a test fee flag to the GAS in the RESPONSE.DAT file. A “P” flag will indicate the test is a paid test. Either a “U” flag or an “F” flag will indicate the test fee is unknown.

(f) If a “P” flag is returned by the VID the test fee will be paid and a new certificate number will be used.

(g) If either a “F” or a “U” flag is returned by the VID, the GAS will ask the inspector to determine if more than 30 days since the last test:

MORE THAN 30 DAYS SINCE LAST TEST? Y/N

[Display 3.13(40)]

(h) If the response is Y, the test fee will be paid and a new certificate number will be used. If the response is N, display:

IS THIS A PAID TEST? Y/N

[Display 3.13(41)]

(i) If the response is Y, the test fee will be paid and a new certificate number will be used. If the response is N, it is a free test.

(21) Received Random TSI Bit

This bit is part of the PROGRAM.DAT file and flags the GAS to run a TSI test on an OBD vehicle for the purpose of data collection and test verification. When this flag is set it shall not take effect until the start of the next Enhanced I/M Testing sequence. (The field where this flag is stored will not be evaluated until the start of the next test.)

3.14 Vehicle Make Abbreviation

(1) The GAS shall prompt the inspector for the vehicle make if contact with the VID was not established, or if there was no data returned from the VID.

Display Prompt for all vehicles.

ENTER THE VEHICLE MAKE

SELECT THE APPROPRIATE MAKE FROM THE LIST.

IF THE MAKE IS NOT LISTED, TYPE IN THE FULL NAME OF THE MANUFACTURER.

[Display 3.14(1)]

(a) The GAS unit will display the complete list of vehicles as contained in the VRT for the model year chosen.

Programming Criteria:

1. Vehicle make names shall be entered by a method, approved by the State, which maximizes user friendliness, preferably via direct cursor selection or the first few letters of the name. For example, the inspector should be able to enter the first letter of the vehicle make which would cause the cursor to go to the first make on the list which would also be highlighted. If that were the correct make, the "enter" key would be pressed. If it is not the correct make, the inspector would at least be close and only have to move the cursor a short distance to the right one.

2. A minimum of one character must be entered.

3. The following display will appear whenever the vehicle make entered is not displayed:

IF THE VEHICLE BEING TESTED IS NOT DISPLAYED,
TYPE IN THE FULL NAME OF THE MAKE

[Display 3.14(2)]

4. The full make name shall be recorded on the test record and displayed and printed on the vehicle-inspection report.

5. After the vehicle make has been entered, the GAS shall search the VRT based on model year, and make, and shall display a list of applicable model names.

The inspector shall be able to select the applicable model by scrolling to his car and/or by entering the first letter(s) of the model name. A function key shall allow the inspector to enter the model name by hand, if it is not in the list.

6. Because of the importance of obtaining a VRT Row match to ensure proper vehicle information for ASM testing, the GAS unit will make all reasonable efforts to match the vehicle information entered, including information returned from the VID, to a specific VRT Row ID number. In order to obtain a VRT Row ID match whenever possible, the following procedure will be used for model, number of cylinders, engine size and transmission type.

7. If this is a manual entry or if the model entry returned from the VID does not match one of the applicable model names from the VRT for that year and make, the list of applicable model names shall be displayed and the inspector instructed to select from the list.

SELECT {ITEM} FROM THE LIST. DO NOT TYPE IN AN ITEM UNLESS THERE ARE NO CORRECT ENTRIES ON THE LIST.

[Display 3.14(3)]

8. ITEMS are a) model, b) body style, c) number of cylinders, d) engine size or e) transmission type. The inspector shall not be required to make a body style entry if there is only one applicable body style for the model listed. In general, a body style entry will be required only for passenger vehicle models available in both sedan and station wagon styles.

9. If a model match is not made, display the following message:

THE MODEL ENTERED DOES NOT APPEAR IN OUR RECORDS FOR THIS VEHICLE TYPE, MAKE, AND YEAR. VERIFY THE VEHICLE INFORMATION AND RE-ENTER THE YEAR, MAKE AND MODEL AS NEEDED.

[Display 3.14(4)]

10. The inspector shall be allowed to make changes to any of the previous entries.

11. If the re-entered information still does not provide a model match, entry of the remainder of the vehicle information may continue.

12. Manufacturers may propose alternative methods to accomplish this same goal, which is the elimination of entry of vehicles that are not found in the VRT.

    (i) If one of the applicable entries is used, the same procedure shall be used for body style (if required), number of cylinders, engine size and transmission type in succession, i.e., if an applicable model is entered, the body style entry returned from the VID should match one of the applicable entries for that year, make and model. If not, or if this is a manual entry, a list of applicable body styles shall be displayed along with the display prompt above. The procedure is then repeated in the same manner for number of cylinders, then for engine size, then for transmission type. Note: No body style information will be returned from the VID for the first test of a vehicle. Body style information will be returned for subsequent tests.

(ii) At this point, the vehicle information should match one row of the VRT. The Row ID number is then entered in the GAS.DAT record.

(iii) If at any point the inspector types in an entry that does not match one of the applicable entries, the vehicle information entry shall continue, but the Default VRT Row ID will be chosen from the default selections based on vehicle type, number of cylinders, etc.

(iv) If all vehicle information returned from the VID can be matched with a VRT Row, the GAS unit may be allowed to proceed through each of these steps without listing the applicable items or requiring an entry by the inspector. However, at a minimum, the inspector must be allowed to make any corrections at the review screen.

(v) If an inspector modifies a vehicle information entry at a later point, e.g., at the data review screen, this process shall be repeated to ensure a VRT match whenever possible.

3.15 Vehicle Body Type, Test Standards Groups, and Special Standards Codes

(1) The GAS shall prompt the inspector to select a vehicle body type to be stored in the corresponding GAS.DAT field.

ENTER THE VEHICLE TYPE:

SELECT THE APPROPRIATE VEHICLE BODY TYPE FROM THE LIST BELOW:

CODE	VEHICLE BODY TYPE
1	SEDAN
2	STATION WAGON
3	PICKUP
4	SPORT/UTILITY VEHICLE
5	MINIVAN
6	FULL-SIZE VAN

[Display 3.15(1)]

(a) If the model year, make and model entered describe a unique vehicle (i.e., a single VRT Row number), the body type may be taken directly from the VRT record and the inspector does not need to be prompted to enter the body type.

(2) The Vehicle Body Type Code will be used to determine the vehicle test standards group (Passenger car or Truck), which will be used for determining the appropriate test standards to be used. Vehicle body type codes 1 and 2 will be tested as passenger cars, while body type code 3-6 will be tested as trucks. The Vehicle Standards Type Code will be stored in the test record.

"P" and "T" code shall be stored in field 29 of the GAS.DAT based on the vehicle body type code as entered or returned from the VID.

Acceptable vehicle test standards group codes are:

CODE	VEHICLE TEST STANDARDS GROUP
P	PASSENGER CAR
T	TRUCK

(3) The Special Standards code, if sent by the VID in the previous test record, will be used for determining the appropriate test standards to be used. This code is only sent for vehicles that have previously qualified for special test standards. The field is not edited from the analyzer.

CODE	SPECIAL STANDARDS CODE
G	GRAND FATHERED WITHOUT CATALYST
H	GRAND FATHERED WITH CATALYST

Note: These vehicle test groups will not be displayed, except for the "grandfather" message below.

(SEE ABOVE*)* "G" and "H" codes may be entered only by the VID. The GAS shall store a returned "G"or "H" in the appropriate field (41) SPECIAL STANDARDS CODE of the GAS.DAT. If "G" or "H" is returned by the VID, display the appropriate following message:

1. For "G" vehicles:

THIS IS A GRAND FATHERED VEHICLE THAT DOES NOT REQUIRE A CATALYTIC CONVERTER INSPECTION.

[Display 3.15(4)]

NOTE: The GAS shall automatically enter "N" in the CATALYTIC CONVERTER field of the GAS.DAT for the inspector.

2. For "H" vehicles:

THIS IS A GRAND FATHERED VEHICLE THAT MUST BE INSPECTED FOR CATALYTIC CONVERTER.

A "P" OR "F" MUST BE ENTERED.

[Display 3.15(5)]

Programming Criteria:

(i). Grand fathered vehicles are gray market vehicles, kit cars, and "hot rods", as defined by EPD. This classification will be used for vehicles that are not expected to meet federal emission standards. Special test standards will be used for these vehicles, and will be determined through the ESC. A determination of Grand fathered status will be made by the management contractor and the vehicle's status will be entered into the vehicle record by the management contractor. Inspectors will not be able to select the "G" or "H" vehicle standards.

(ii) The inspector shall be required to enter the gross vehicle weight rating (GVWR) only if the vehicle type is "T".

(iii) The analyzer shall be designed so that only G, H, or a blank can be stored in this field, and those codes can only be inserted by the VID. If a "G" or "H" is returned from the VID, the inspector may not change it.

If Special Standards code “G” or “H” is returned from the VID, the VRT lookup for the vehicle shall not be performed. Test type shall always be 2-speed idle and TSI REASON code four (4) shall be stored in field 45 of the GAS.DAT. Standards for the test shall be determined based on 1975 model year for passenger vehicles. GRANDFATHERED shall be written on the VIR in place of the standards type (in place of passenger or truck).

NOTE: EPD will only approve Phase III software that automatically selects the TSI test sequence for grand fathered vehicles. EPD will train all certified inspectors and inspection stations that grand fathered vehicles are to be tested using the TSI test sequence.

3. Error Message:

VEHICLE TYPE CODE IS NOT VALID - TRY AGAIN

[Display 3.15(6)]

3.16 Gross Vehicle Weight Rating

(1) For vehicle types 3 through 6, the GVWR shall be entered. The GAS shall store the entered GVWR in the corresponding field of the GAS.DAT.

ENTER THE GROSS VEHICLE WEIGHT RATING (GVWR) IN LBS,
IF GVWR IS NOT AVAILABLE, ENTER "NONE".

[Display 3.16(1)]

Programming Criteria

(a) If the inspector enters NONE, the analyzer shall display the following prompt:

IF THE VEHICLE IS A SMALL PICKUP, SPORT/UTILITY VEHICLE OR MINIVAN OR IS A FULL-SIZE PICKUP OR VAN RATED AS A ½ TON (FOR EXAMPLE: GM 10 OR 15 SERIES, FORD OR DODGE 100 OR 150 SERIES) ENTER 5999 FOR GVWR.

IF THE VEHICLE IS RATED AS A 3/4 TON OR 1 TON (FOR EXAMPLE: GM 20, 25, OR 30 SERIES OR DODGE 250 OR 350 SERIES) ENTER 8499 FOR GVWR.

[Display 3.16(2)]

Error Messages:

NO VALUE HAS BEEN ENTERED - TRY AGAIN

TOO MANY CHARACTERS HAVE BEEN ENTERED - TRY AGAIN

WEIGHT RATING MUST BE AT LEAST 2500 LBS. - TRY AGAIN

[Display 3.16(3)]

(2) The GVWR must be printed on the VIR.

3.17 Number of Cylinders

(1) The GAS shall prompt the inspector to enter the number of cylinders of the engine and store that number in the corresponding field of the GAS.DAT.

ENTER THE NUMBER OF CYLINDERS. FOR ROTARY ENGINES, ENTER "R".

[Display 3.17(1)]

Programming Criteria

(a) The minimum Number of Cylinders is '3' and the maximum is '16.' Any entries outside of '3-16' will be rejected by the system.

(b) For Rotary engines, the inspector shall be prompted to enter an "R". However, the software shall translate the entry to "17" for the test record.

(c) Error Messages:

NO VALUE HAS BEEN ENTERED - TRY AGAIN
NUMBER OF CYLINDERS ENTRY IS NOT VALID - TRY AGAIN

[Display 3.17(2)]

(2) The number of cylinders shall be printed on the VIR. The letter "R" shall be printed on the VIR for Rotary engines.

3.18 Vehicle Engine Size

(1) The GAS shall prompt the inspector to enter the size of the engine and store the entered size in the corresponding field of the GAS.DAT if the engine size was not returned from the VID, or is not correct.

ENTER THE VEHICLE'S ENGINE SIZE:
ENTER THE ENGINE SIZE FOLLOWED BY ONE OF THE FOLLOWING CODES.

CODE	DESCRIPTION
I	CUBIC INCHES
L	LITERS
C	CUBIC CENTIMETERS

[Display 3.18(1)]

Programming Criteria

(a) The first five bytes shall be the engine size. Last byte shall be the unit used for the engine size, and shall be "L" for liters, "I" for cubic inches, and "C" for cubic centimeters. The analyzer software shall be designed so that only an I, L or C can be entered for the units. Liter size entries shall be a numeric, decimal point, and numeric. Although the internal storage on the GAS record is to be automatically converted to cubic centimeters, the display shall remain in the original units entered.

(b) To convert from cubic inches to cubic centimeters, multiply by 16.387. To convert from liters to cubic centimeters, multiply by 1000. Products shall be rounded to the nearest cubic centimeter.

(c) An error message shall be displayed if the inspector enters an equivalent engine size greater than 17,000 cc (equivalent to 1,037 CID) or smaller than 500 cc. The inspector shall be instructed to correct the entry or abort the test. If the vehicle under test is not in the VRT (for example, pre-1966 vehicles) AND the engine size entered by the inspector is greater than 10,650 cc (649 CID), the GAS shall display the prompt:

ENGINE SIZE IS GREATER THAN 649 CID (l0.65 LITERS). ARE YOU SURE THIS IS CORRECT? (Y=YES, N=NO)

[Display 3.18(2)]

(d) If the inspector answers "Y", the GAS shall accept the entry and continue with the test. If the inspector answers "N" the GAS shall revert to the "ENTER ENGINE SIZE" screen.

(e) Error Messages:

NO VALUE HAS BEEN ENTERED - TRY AGAIN

ENGINE SIZE OR UNIT DESIGNATION (I, L, or C) IS NOT VALID FOR THIS YEAR, MAKE, AND MODEL OF VEHICLE- TRY AGAIN.

[Display 3.18(3)]

3.19 Transmission Type

(1) The GAS shall prompt the inspector to enter the transmission type of the vehicle if not returned from the VID and store the entered value in the corresponding field of the GAS.DAT.

INDICATE THE TYPE OF TRANSMISSION:

ENTER AS "M" IF IT IS A MANUAL

ENTER AN "A" IF IT IS AN AUTOMATIC

[Display 3.19(1)]

Programming Criteria

(a) This information will be used to determine emission control system requirements.

(b) Error Message:

NO VALUE HAS BEEN ENTERED - TRY AGAIN

[Display 3.19(2)]

(2) The transmission type shall be printed on the VIR.

3.20 RESERVED

3.21 Vehicle Odometer Reading

(1) The GAS shall prompt the inspector to input the odometer reading and store the entered reading in the corresponding field of the GAS.DAT

ENTER THE VEHICLE'S ODOMETER READING:

A MINIMUM OF ONE NUMERIC ENTRY IS REQUIRED.

DO NOT ENTER THE TENTHS DIGIT.

[Display 3.21(1)]

Programming Criteria

(a) Upon receipt of the previous odometer reading from the VID, if any, the GAS shall automatically perform a calculation against the current odometer reading and shall alert the inspector if the current odometer reading is less than the previous reading.

(i) The GAS shall display the following message:

ODOMETER READING ERROR PLEASE VERIFY AND REENTER.

IF ODOMETER READING IS CORRECT,

PLEASE PRESS A <F Key> TO CONTINUE.

[Display 3.21(2)]

(b) The odometer entry shall be printed on the VIR.

(c) The analyzer shall only accept an entry of all numbers or the word, "NONE", in the odometer field. If the inspector enters "NONE", the analyzer shall translate this to, "000000", for the test record. For the VIR and the certificate, the analyzer shall print the word "NONE" and the display shall indicate "NONE".

(d) If the inspector enters an odometer reading higher than 99,000 miles for a vehicle five or less model years old the following prompt shall be displayed:

MILEAGE ENTERED IS HIGH FOR THE AGE OF THIS VEHICLE.

REENTER THE MILEAGE. DO NOT ENTER lOths OF MILES.

IF THE MILEAGE IS CORRECT, ENTER "C" TO CONTINUE.

[Display 3.21(3)]

The inspector shall be allowed to reenter the mileage or enter "C" to continue. The analyzer shall accept the second entry without further delays.

(e) If the inspector enters an odometer reading of less than 100,000 miles and the vehicle is 15 or more model years old the following prompt shall be displayed:

MILEAGE ENTERED IS LOW FOR THE AGE OF THE VEHICLE.

CHECK THE MILEAGE AND TRY AGAIN.

IF THE ENTRY IS CORRECT, ENTER "C" TO CONTINUE.

[Display 3.21(4)]

The inspector shall be able to reenter the mileage or enter "C" to continue. The analyzer shall accept the second entry without further delays.

(f) Error Messages:

NO VALUE HAS BEEN ENTERED - TRY AGAIN

ODOMETER READING IS NOT VALID - TRY AGAIN

[Display 3.21(5)]

(2) The GAS shall store the entered mileage in the corresponding field of the GAS.DAT.

3.22 RESERVED

3.23 Vehicle Fuel Type Code

(1) The GAS shall prompt the inspector to enter the fuel type of the vehicle being tested and store the response in the corresponding field of the GAS.DAT.

ENTER THE FUEL TYPE CODE FROM THE LIST BELOW:

CODE	**FUEL TYPE**
G	**GASOLINE**{Default}
B	**BI-FUELED (alternate fuel and gasoline)**

[Display 3.23(1)]

Programming Criteria

(a) A value must be entered. Only the codes above can be entered. The default code is "G".

(b) If "B" is selected, the inspector will be instructed to perform the inspection on gasoline.

BI-FUEL VEHICLES ARE TO BE TESTED ON GASOLINE.

[Display 3.23(2)]

3.24 Dual Exhaust

(1) The GAS shall prompt the inspector for the type of exhaust system and store the result in the corresponding field of the GAS.DAT.

DOES THE VEHICLE HAVE DUAL EXHAUST?

Y = YES
N = NO{Default}

[Display 3.24(1)]

Programming Criteria

(a) The software shall ask the operator to indicate if the vehicle is equipped with dual exhaust.

(b) If the operator answers, "YES", then the manufacturer shall display instructions to the inspector in accordance with the requirements of Section 2. If the operator answers, "NO", the analyzer shall automatically proceed to the next item. The analyzer software shall be designed so that only a Y or an N can be entered by the inspector for this field.

(c) Error Message:

INVALID ENTRY - TRY AGAIN

[Display 3.24(2)]

3.25 OBD Test Sequence

(1) If the MY entered is for a 1996 or newer vehicle and the FORCE TEST TYPE field 34 of the VRT is set to "BLANK" the inspector shall be prompted to perform an OBD test sequence. The option to run a TSI test is controlled by field (13) of the PROGRAM.DAT file. The GAS shall check the status of the OBD hardware prior to proceeding to the OBD test sequence. If there is OBD hardware problems the GAS shall inform the operator of the problem and, if not corrected shall abort the test.

Display the following message if there is an OBD hardware problem,

A PROBLEM EXISTS WITH THE OBD TEST SYSTEM, CHECK CONNECTIONS TO CORRECT THE PROBLEM, OR CALL FOR SERVICE

[Display 3.25(0)]

Display the following message if field OBD OR TSI OPTION (field13) is a "Y" in the PROGRAM.DAT file.

OBD TESTING HAS BEEN DETERMINED FOR THIS VEHICLE BASED ON THE MODEL YEAR. PRESS ENTER TO PERFORM THE OBD TEST SEQUENCE,

ENSURE THE FUEL CAP IS SECURELY IN PLACE PRIOR TO PROCEEDING, OR

PRESS <F Key> **TO PERFORM A TSI TEST**

[Display 3.25(1)]

or,

Display the following message if the TSI OPTION (field 13) is an "N" in the

PROGRAM.DAT file:
OBD TESTING HAS BEEN DETERMINED FOR THIS VEHICLE BASED ON THE MODEL YEAR. PRESS ENTER TO PERFORM THE OBD TEST SEQUENCE.

ENSURE THE FUEL CAP IS SECURELY IN PLACE PRIOR TO PROCEEDING,
[Display 3.25(2)]

(a) If the inspector presses enter then the GAS shall prompt the inspector through an OBD test sequence as outlined in Appendix-F. During the Advisory period, the OBD test sequence may be the only emission test performed on the vehicle, see the last subsection of the OBD Appendix – F section "OBD Test Evaluation". Vehicles receiving an OBD test shall have the Functional test sequence performed to evaluate the fuel cap(s) on the vehicle.

(b) If the inspector presses the <F Key> to bypass the OBD to perform a TSI test sequence the GAS shall prompt the inspector through a complete TSI test (tampering, tailpipe, fuel cap). The GAS shall store a "4" (other) in the "REASON TSI TESTED" field of the GAS.DAT.

(c) if the FORCE TEST TYPE field 34 of the VRT is "T" then the GAS shall not perform an OBD or ASM test but shall proceed to the TSI test sequence.

Programming Criteria

(a) Manufacturers shall display all previous entries and allow the inspector to edit, the information. The software shall be designed to require the inspector to confirm that previous entries are correct before allowing the emissions test to be initiated. The software shall not allow a change to the VIN at this point in the process.

(b) If this is an after repairs test and this portion of the test has been passed previously, this portion may be bypassed.

(c) if the FORCE TEST TYPE (field 34) of the VRT is "T" then the GAS shall not perform an ASM or OBD test but shall proceed to the TSI test sequence. The GAS shall store a "6" in the "REASON TSI TESTED" field (45) of the GAS.DAT indicating that the TSI test was forced by the VRT.

(d) if the FORCE TEST TYPE (field 34) of the VRT is a "T" then the GAS shall proceed to the Tampering Inspection which shall be followed by the appropriate TSI tailpipe test sequence.

(2) If the MY entered is for a 1995 or older vehicle, or is a newer vehicle receiving a random tailpipe verification, the inspector shall be prompted to proceed to the Tampering Inspection Section 3.26.

3.26 Tampering Inspection

(1) For ASM and TSI tests, the tampering inspection will be limited to the catalytic converter. No data entry screening via matching with the VRT will be required

(2) The GAS shall prompt the inspector to look for the existence of a catalytic converter and

store the results in the corresponding field of the GAS.DAT.

PERFORM THE INSPECTION FOR THE PRESENCE OF A CATALYTIC CONVERTER.

ENTER ONE OF THE FOLLOWING CODES FOR THE INSPECTION:

P **PRESENT**
F **MISSING/FAIL** {Default}
N **NOT APPLICABLE**

Display [3.26 (1)]

Note: default value is F

(3) The result of "PRESENT", "FAIL", or "NA" shall be printed on the VIR.

(4) The GAS shall proceed to the Emission Testing Sequence Section 3.27.

3.27 Emission Test

(1) For ASM and TSI tests, the inspector shall be able to edit the ASM/TSI test type. The inspector is ultimately responsible for performing the correct emissions test.

REVIEW THE VEHICLE IDENTIFICATION AND TAMPERING INSPECTION ENTRIES FOR ACCURACY. IF THE INFORMATION IS CORRECT, PRESS <CONTINUE>. **IF NOT, MAKE THE NECESSARY CORRECTIONS.**

PROCEED WITH (ASM OR TSI) TEST

[Display 3.27(1)]

Programming Criteria

(a) Manufacturers shall display all previous entries and allow the inspector to edit, the information. The software shall be designed to require the inspector to confirm that previous entries are correct before allowing the emissions test to be initiated. The software shall not allow a change to the VIN at this point in the process.

(b) If this is an after repairs test and this portion of the test has been passed previously, this portion may be bypassed.

(c) if the FORCE TEST TYPE (field 34) of the VRT is "T" then the GAS shall not perform an ASM test but shall proceed to the TSI test sequence. The GAS shall store a value of 6 in the REASON TSI TESTED field (45) of the GAS.DAT

(2) Emission Test
The inspector shall be prompted by the analyzer to attach the RPM pickup, start the engine, insert the exhaust probe, and then perform the appropriate test sequence described in Section 2 (i.e.: ASM for older vehicles, OBD for newer vehicles, TSI on older vehicles exempt from ASM testing, or TSI on newer vehicles receiving a random tailpipe check).

3.28 ASM Emission Test Sequence

(1) Test Sequence: The test sequence shall consist of an ASM2 two-mode test as described in Appendix- F ASM2 Test Sequence. Vehicles that fail the mode1 test shall receive a second chance (continuation of the mode1 test). Vehicles that fail the mode1 portion of the ASM test sequence shall not receive a second chance in mode 2 (continuation of mode 2) if mode2 also has failing values. Vehicles that pass mode1 but are failing mode2 shall receive a second chance at passing mode2 (continuation of mode2). Gross polluters (readings over one and a half times the applicable cutpoints) shall not receive a second chance (continuation) for either mode1 or mode2

Programming Criteria

(a) Start of test - The software shall prompt the inspector to perform any safety procedures or checks required by the equipment manufacturer, and then to drive the vehicle on the dynamometer, laterally stabilize, restrain and chock the wheels of the vehicle. The prompts shall include tire drying, where required, and the positioning of the cooling fan when the ambient temperature exceeds the temperature set in the specification section elsewhere in this document.

DRIVE THE VEHICLE ONTO THE DYNAMOMETER AND LATERALLY STABILIZE.

TURN OFF ALL ACCESSORIES.

RESTRAIN THE VEHICLE. CHOCK WHEELS. SET THE PARKING BRAKE FOR FRONT WHEEL DRIVE VEHICLES.

IF TIRES ARE WET, DRIVE AT 15 MPH UNTIL DRY.

POSITION THE COOLING FAN IN FRONT OF THE VEHICLE. (Display THIS line only if temperature is over 50 degrees F)

[Display 3.28(1)]

(b) Vehicle test horsepower and test weight selection - The test horsepower and test weight shall be selected based on the following criteria: The test horsepower and test weight shall be selected from the VRT row number chosen in the vehicle information entry process. If a specific VRT cannot be matched, the default VRT test horsepower and test weight values based on the vehicle year, type, number of cylinders, etc., shall be used.

(c) Gear selection -

1. Automatic transmission - The inspector shall be prompted to place the transmission in Drive.

PLACE THE TRANSMISSION IN DRIVE. IF THE ENGINE RPM EXCEEDS _____, PLACE THE TRANSMISSION IN OVERDRIVE.

[Display 3.28(2)]

RPM limits -

Engine of 3.0 liters or less - 3000 rpm
Engine of greater than 3.0 liters - 2500 rpm

2. Manual transmission - The inspector shall be prompted to place the transmission in second gear

PLACE THE TRANSMISSION IN SECOND GEAR. KEEP THE ENGINE BETWEEN _____ AND _____ RPM.

[Display 3.28(3)]

RPM limits
Engine of 3.0 liters or less - 1500 to 3000 RPM
Engine of greater than 3.0 liters - 1250 to 2500 RPM

3. Pre-test conditions: The following conditions must be met before the ASM test will be allowed to proceed.

(i) the dilution threshold limits must be met.

(ii) The GAS unit must not detect a low-flow condition.

(iii) the idle speed must be between 400 and 1250 RPM.

(iv) the dynamometer rolls shall not be turning (speed less than 1 mph).

(v) Once these conditions are met, the inspector can be prompted to begin the preconditioning sequence. When the 30-second preconditioning sequence at 25 mph has been successfully completed, the inspector shall be instructed to begin the ASM test. The ASM test timer shall start when the vehicle speed, engine RPM, dynamometer loading, and dilution are within the test limits.

4. Display prompts during the test: If at any time during the emission averaging portion of the ASM test, the vehicle speed, engine RPM, dynamometer loading or dilution fall outside the allowable range, the software shall display the appropriate message below to prompt the inspector to correct the problem.

OUTSIDE TEST SPEED LIMIT [Display 3.28(4)]

OUTSIDE ENGINE RPM RANGE [Display 3.28(5)]

DYNO LOADING ERROR [Display 3.28(6)]

OUTSIDE DILUTION LIMITS [Display 3.28(7)]

As soon as the emission averaging portion of the ASM test has begun, begin monitoring the vehicle's acceleration every 0.5 seconds. If at any time the acceleration exceeds 0.4 mph/second, the software shall display the following message to prompt the inspector that the acceleration is out of range.

OUTSIDE THE MAXIMUM ACCELERATION LIMIT [Display 3.28(8)]

Emissions resulting from transient throttle shall not be included in the ten-second averaging data. In addition, if an acceleration violation occurs, that time aligned data must not be used in the emissions averaging. Instead, the emissions averaging will continue five seconds after the time-aligned acceleration violation ceased. If this event occurs near the end of the test (meaning another 10-second

average cannot be completed), the last full 10-second average will be the ending result for the mode

When ten seconds have passed since the start of the emission-averaging portion of the test, the software shall keep track of the number of violations. The data shall be recorded in the test record (Acceleration Violations Mode 1 or Acceleration Violations Mode 2, as appropriate). If the number of acceleration violations exceeds five or the cumulative time exceeds five seconds, the inspector shall be prompted to restart the test.

(d) Restart Procedures: Bring the rollers to a full stop. Reset the test timer to zero. The software shall prohibit the restart of the test until the vehicle has idled (engine speed less than 1250 RPM for 15 seconds and greater than 0 RPM for 30 seconds).

Conditions causing test mode restart:

- Vehicle or equipment unable to stabilize within the required stabilization time.
- Acceleration violation exceeding the limits listed above.
- Dynamometer loading outside specification for at least two consecutive seconds.
- Sample dilution
- Engine or vehicle speed out of range for more than two consecutive seconds or more than five seconds cumulative
- Inadequate number of ten-second averages

The software shall count the number of restarts during the test. The count shall be written to the test record (ASM Restart Counter). The maximum number of restarts is two during each mode. If that number is exceeded, the test will be aborted. ASM tests with no restarts will record a zero in the field. The restart counter shall be reset to zero (0) at the beginning of mode 2. Two-speed idle test will be left blank.

NOTE: Only one reset counter is needed since the test aborts if the count is exceeded.

Conditions causing the test to abort:

- Safety related issues
- Equipment failure
- Power loss
- Any restart condition listed above, except the engine RPM violation, occurring more than twice.

3.29 Vehicle Preconditioning Sequence (TSI)

(1) If the vehicle under test has failed the first attempt at a TSI test then it shall go through preconditioning. After the preconditioning, the vehicle shall receive a second chance at passing the TSI test.

(2) The preconditioning sequence is found in Appendix-H.

(3) The preconditioning sequence shall not be required if the value stored in the CATALYTIC CONVERTER field of the GAS.DAT is not a "P".

3.30 Functional Checks

The GAS shall prompt the inspector to perform a functional check of the fuel cap(s) on the vehicle under test. The GAS shall allow the operator to bypass the fuel cap test if there is no adapter available to test the fuel cap. The GAS shall allow the inspector to test up to two fuel caps per vehicle. See Appendix-I for the Functional fuel cap test sequence.

3.31 Pre-inspection Repairs (For After Repairs Tests Only)

The GAS shall prompt the inspector for repair information after the Fuel Cap inspection and prior to the completion of the Georgia I/M test sequence.

PRIOR TO THE START OF THIS INSPECTION, WERE ANY REPAIRS MADE TO THE EMISSION CONTROL COMPONENTS OF THIS VEHICLE?

ENTER "Y" FOR YES OR "N" FOR NO

[Display 3.31 (1)]

Programming Criteria

a. Entry is required before proceeding to the next item. The display prompt shall be displayed for all test types except an "I". The analyzer software shall be designed so that only a "Y" or an "N" can be entered by the inspector for this field and shall be stored in the Pre-Inspection Repairs field 95 of the GAS.DAT.

b. Entry of "YES" will cause the "Repair Action Categories" to be displayed and an entry on that menu will be required prior to allowing the inspector to proceed to the next item. See section 3.32 Repair Action Categories.

c. Error Messages:

NO ENTRY HAS BEEN MADE - TRY AGAIN

[Display 3.31 (2)]

3.32 Repair Action Categories

(1) The GAS shall prompt the inspector to enter the ten (10) digit repair facility telephone number. The inspector shall be prompted to note which items were repaired on the vehicle prior to being tested.

ENTER THE 10-DIGIT REPAIR FACILITY NUMBER

Enter <F key1> for UNKNOWN shop or
<F key2> for OWNER repair.

ENTER "Y" FOR EACH REPAIR TYPE PERFORMED

[Display 3.32(1)]

(a) Repair Facility Number: The repair facility number field is a 10-digit numeric. The number is

based on the 3-digit area code and the 7-digit telephone number. The GAS must verify all 10 digits have been entered. If less than 10 digits have been entered, the inspector shall be prompted to reenter the number. The GAS shall store the entered number in "REPAIR FACILITY NUMBER" field 96 of the GAS.DAT.

1. If the <F key1> is pressed the GAS shall populate the "REPAIR FACILITY NUMBER" field 96 of the GAS.DAT with all 1's indicating that the shop phone is unknown.

2. If the <F key2> is pressed the GAS shall populate the "REPAIR FACILITY NUMBER" field 96 of the GAS.DAT with all 9's indicating that the owner performed the repair.

(b) Repair Categories

1. Ignition System Repairs
2. Intake/Fuel Induction System
3. Engine Diagnostics
4. Fuel Cap/Tank/Evaporative Control
5. EGR System
6. Sensors, Switches and Computer
7. Fuel Fill Pipe or Exhaust System
8. Air Injection System Repair
9. Internal Engine Repairs
10. Other ASM or OBD Related Repairs

Programming Criteria

a. The software will display the repair categories (listed above). The inspector shall not be required to make an entry for each item, only the items selected by scrolling the cursor (or whatever selection system is used).

b. Only the letter "Y" shall be entered for each applicable menu item. No other entries are acceptable. The default entry is "N". It is permissible to make entries in none of the categories.

c. The "Repair Facility Number" and "Repair Action Categories" shall also be displayed whenever the inspector indicates that pre-inspection repairs were accomplished prior to or during an "A" test. Only the letter "Y" shall be entered for each applicable menu item.

d. Warning Message:

THE REPAIR ACTION CODE IS NOT VALID - TRY AGAIN

[Display 3.32(2)]

e. After the repair category entries are made, the inspector shall be prompted:

WHERE ANY OTHER EMISSION RELATED REPAIRS RECOMMENDED, BUT NOT PERFORMED? (IS BOX CHECKED? Y/N) {Default is N}

[Display 3.32(3)]

The inspector may enter "Y". The default entry is "N", the inspector's response shall be stored in the corresponding field 107 of the GAS.DAT.

3.33 Parts and Labor Cost

Programming Criteria

1. For all "After Repair Tests" (A-test) where the inspector indicated pre-

inspection repairs were performed, the GAS shall require the inspector to enter repair cost information (parts and labor) after the functional check results have been entered. The GAS shall not allow the inspector to conclude the Georgia Emission Test inspection process without entering repair cost information.

The repair cost information to be entered shall include repairs that have been performed to correct tampered (missing, modified or disconnected) emission control systems and emission-related repairs.

2. After the appropriate repair action codes have been entered, the GAS shall require entrance of the repair cost information. The GAS shall display the following message:

FROM THE "EMISSION REPAIR FORM" ENTER THE TOTAL AMOUNT OF MONEY CHARGED THE CONSUMER FOR PARTS AND LABOR TO PERFORM EMISSION-RELATED REPAIRS.

ENTER $0 FOR LABOR IF OWNER/SELF REPAIR.

ENTER THE DOLLAR AMOUNT ONLY.

TOTAL PARTS COST $ ____.00
TOTAL LABOR COST $ ____.00

[Display 3.33 (1)]

(a) If no repair categories have been entered or if no repair fee was charged, the inspector shall be allowed to enter $0 for parts and/or labor. The GAS shall display the inspector's entry but shall disregard any portion less than a whole dollar amount for the test record. The GAS shall store the repair parts and labor cost information in the test record.

(b) If the inspector enters a value of over $500 in either category (PARTS or LABOR) above, the GAS shall display the following message:

COST ENTERED APPEARS HIGH, PLEASE VERIFY AND REENTER IF NEEDED, OR PRESS ENTER TO ACCEPT AND CONTINUE.

[Display 3.33(2)]

For vehicles that fail the Georgia Emission Test inspection for any reason, the GAS shall print the "For failed vehicles" message on the VIR, as described in Section 5.

3.34 Display Test Results

At the conclusion of the inspection/test, the analyzer shall display a summary of the results. This shall include a list of underhood inspection items not passed, all emission readings with a Pass/Fail reading beside each, any functional inspection failures and a list of items repaired.

3.35 Test Fee Entry

At the conclusion of each paid test, the inspector will be prompted to enter the inspection fee charged. For paid tests, the appropriate value in the FEE.DAT file (Paid Test Fee OBD or Paid Test Fee -ASM) will be displayed. The inspector will be allowed to modify the value displayed within the range of MIN-to-Max Paid Test Fee OBD or Min-to-Max Paid Test Fee - ASM in the FEE.DAT file. This fee will be stored in the test record and printed on the VIR. For free retests ("Paid Test?" = "N"), the fee will automatically be entered on the VIR as "FREE".

ENTER THE TEST FEE CHARGED.

[Display 3.35(1)]

3.36 Abort Codes

(1) If a testing sequence was aborted either by the inspector or automatically by the GAS then the following message and codes shall be displayed. The inspector shall be allowed to cancel an abort if not done automatically by the GAS.

ENTER THE CODE THAT BEST DESCRIBES THE REASON THE TEST WAS ABORTED:

SELECT AND ENTER THE APPROPRIATE ESCAPE CODE FROM THE LIST BELOW:

THESE CODES RESULT IN A TEST FAILURE - **FEE IS DUE**

$-01 OIL SYSTEM LEAK/ WARNING LIGHT
$-02 TRANSMISSION LEAKS
$-03 COOLANT SYSTEM LEAKS/OVERHEAT
$-04 FUEL LEAK
$-05 SAMPLE DILUTION
$-06 RPM TOO HIGH
$-07 RPM TOO LOW
$-08 EXCESSIVE ENGINE NOISE
$-09 OTHER SAFETY PROBLEM

CODES ABORT THE TEST - **NO FEE IS DUE**

87 OBD DIAGNOSTIC LINK CONNECTOR NOT FOUND
88 INCORRECT EMISSIONS TEST TYPE
89 ASM RESTART VIOLATION
90 BMW/PEUGEOT/VOLVO TRANSMISSION
91 INSPECTOR DOES NOT HAVE PROPER LICENSE
92 VEHICLE DOES NOT REQUIRE INSPECTION
93 UNABLE TO OBTAIN RPM READING
94 NO REPAIR FORM COMPLETED
95 LOW FLOW RATE
96 RPM TOO LOW
97 RPM TOO HIGH

98 DILUTION LIMIT NOT MET
99 OTHER - INDICATE REASON ON VIR

50 INCOMPLETE RECORD {Note: this code is not to be displayed on the inspector screen.}

[Display 3.36 (1)]

Programming Criteria

a) A maximum of two bytes have been provided for this entry. All of the inspection and test data collected up to the time the abort is initiated shall be recorded on the test record and the VIR. An abort code of 50 shall be entered at the first write to the test record. If the test is aborted, the appropriate abort code will be written over this default entry.

b. If the emissions test must be aborted after the sampling period has started, the latest five- (or ten, as appropriate) second average (or the average of whatever portion of the first 5 (or ten) seconds of the sampling period has elapsed) shall be treated as the "final value". Emission readings shall be taken during all testing modes and the "final" reading shall be recorded on the test record but not the VIR. No emission readings or pass/fail results from an emission test shall be displayed for an emission test that was incomplete or aborted. However, results are to be displayed if the inspection is aborted after the emissions portion of the test is completed. The analyzer shall be designed so that the inspector can initiate the "ESCAPE" or "ABORT" sequence by depressing a maximum of one key. The analyzer software shall enter leading zeros.

c. The analyzer shall be designed so that the inspector is required to confirm the initial abort command after entering the applicable abort code. The inspector shall be allowed to edit the abort codes up until the confirmation is made. If the inspector wants to return to the test, and not continue with the abort sequence, he/she shall be allowed to do so prior to the confirmation. The inspector shall be returned to the beginning of the test sequence where they were when the abort was initiated (for example: an Abort initiated during the emission portion of the ASM2 test shall return the inspector to the start of the ASM2 tailpipe test sequence, not to the beginning of the Tampering Inspection). However, if the abort was initiated during the emissions test, the inspector shall be returned to the beginning of the emissions test sequence. Unconfirmed aborts shall not be recorded on the test record. Only one confirmed abort shall be allowed per test sequence, and only one unconfirmed abort shall be allowed (the inspector shall only be allowed to rescind an abort one time, the second initiated abort is a mandatory abort).

d. Data entry errors will be displayed as the following message(s):

NO VALUE HAS BEEN ENTERED - TRY AGAIN

[Display 3.36(2)]

Or,

ONLY ONE ABORT CODE MAY BE ENTERED - TRY AGAIN

[Display 3.36(3)]

Section 4 - Test Records

4.01 Vehicle Test Record

(1) The test record shall document all of the vehicle identification and test data information gathered during the inspection and emissions test. The legend that follows identifies the meaning of the characters that inspectors are allowed to enter. See Appendix C under GAS.DAT. GAS.DAT files shall be reset to zero length after successful transmission of the inspection records to the VID. A copy of each record shall be appended to the C:\GASDATA\GAS.HST file following transmittal of the GAS.DAT file. GAS.HST shall contain a minimum of the last one thousand (1,000) test records.

The A:\GAS.DAT shall serve as an emergency back-up copy of the "C:\GASDATA\GAS.DAT" file and shall be used if a loaner unit is to be initialized. The records from the "A:\GAS.DAT" file shall only be removed after they have been transmitted to the VID.

(a) The test record shall be written in steps as follows: The initial test record shall be created after the results of the Tampering Inspection have been entered since prior to that time an abort would not be a paid abort. Subsequent write actions shall be made as information is added to the GAS.DAT record. The final vehicle test record shall be written after the "Overall Test Result" has been determined for a pass, fail, or paid aborted inspection. The GAS shall then make the "End-of-Test" contact after a fail, or paid abort. A passing test record or unpaid abort shall be uploaded to the VID during the next “Beginning-of-Test” contact.

(b) The periods in the decimal point/colon position shall go on the data file, and the data shall be oriented as shown in this column. No entry to the left of the decimal point/colon shall be replaced by ASCII spaces except for the month on the date item where "zeros" shall be used, i.e., February shall be "02". No entry to the right of the decimal point shall be replaced by zeros.

1. Positive values do not require a sign. Negative values require a sign in the leftmost (first) position. Example as all numeric only fields are right justified and padded with zeros a five character field containing the value -2.1 would be written to the test record file as "-02.1". An extra byte has been provided in the test record where a negative value might occur.

(c) For the date: M = month, D = day, Y = year (use last four digits of the year), i.e., February 3, 2002, shall be 02032002.

(d) GAS Number: The leftmost two characters shall be alphas denoting the manufacturer's initials. The initials chosen shall be subject to approval by EPD to prevent duplication. The right most six numeric characters shall be right justified, with zeros for unused spaces on the left, i.e., GAS number 23 shall be AA000023 for manufacturer AA. Currently the manufacturer designations are as follows: ESP equipment = HT, John Bean equipment = JB, SPX equipment = BA, and Sun/Snap-On equipment = SE.

(e) Analyzers shall store the current test record number in field number 1 of the test record. The field shall be six numeric characters in length, and the computer software shall do entry into this field. The test record number shall be a consecutive number from the first vehicle test performed on the analyzer through the maximum number possible before automatic reset. For example, the first test record would be 000001, the last test record before reset would be 999999. The unused test record numbers shall be stored in a protected file for access only by the analyzer software, and shall require controlled access available only to the manufacturer's service technician.

(2) The "Install New Data Disk" function shall not transfer records from GAS.DAT to GAS.HST.

(3) Appendix C contains format of the test record. It is critical that equipment manufacturer structure the test record file exactly as indicated in the table so that data can be easily analyzed at the State. The column titled, "Entry Method", indicates if the inspector will be entering the data for that field or if the analyzer will do it (based on internal file information or information derived from testing). Data entered by the inspector may be entered through the keyboard.

All numeric fields when empty are zero-filled unless otherwise noted, and alphanumeric fields are space-filled. Any reference to a "blank" field means that the field must be filled with ASCII spaces). Because many programs consider an ASCII "space" character to be an alpha character, some fields listed as numeric that allow a space to be entered, could be considered an alpha/numeric field.

Note: All fields shall be written as ASCII character data to the file. All data descriptions in this table under "Field Descriptions" refer to characters allowed within the field.

4.02 Calibration and Other Data

(1) CAL.DAT shall be created during the end of any calibration routine. The fields of the CAL.DAT file are listed in Appendix-C DATA File Structure. The GAS software version number as well as weather station data (ASM units only) taken at the time of calibration is to be stored in their corresponding fields at the creation of the CAL.DAT file. The software version and weather information shall allow closer monitoring of GAS information by EPD.

(2) Results of the leak check shall reside in the CAL.DAT file. If a leak check is the only calibration performed then that result, and the GAS number, station number, date, time, weather information (ASM), and GAS software version shall be populated. All other fields shall be left blank.

(3) Results of the Dynamometer calibration shall be stored in the CAL.DAT file. If the Dynamometer only is calibrated then the results of that test and the GAS number, station number, date, time, weather (ASM), and software version shall be stored. All other fields shall be left blank.

(4) Results of the fuel cap calibration tester shall be stored in the CAL.DAT file. If the fuel cap tester only is calibrated then those results and the GAS number, station number, time, weather (ASM), and GAS software version shall stored. All other fields shall be left blank.

(5) Results of a GAS bench calibration shall be stored in the CAL.DAT file in their respective fields: Before-calibration readings of CO, HC, CO2, O2, and NO (ASM) shall be stored in their corresponding fields. Results of the after-calibration readings shall be stored in the corresponding fields in the CAL.DAT. If the GAS bench only is calibrated then the results shall be stored along with the GAS number, station number, date, time, weather (ASM), and GAS software version. All other fields shall be left blank.

(6) TAMPER.DAT will be used by the communications software to create LOCKOUT.DAT. The GAS shall allow this file to be transferred to the VID

01	QA/State GAS Lockout	"Clear" or "Locked - MMDDYYYY"
02	QA/State ASM lockout	"Clear" or "Locked - MMDDYYYY"
03	Cabinet Tampering	"Clear" or "Locked - MMDDYYYY"
04	State disk drive tampering	"Clear" or "Locked - MMDDYYYY"
05	Certificate Area Tampering	"N/A" (see NOTE)
06	Station license suspended	"Clear" or "Locked - MMDDYYYY"
07	Station license revoked	"Clear" or "Locked - MMDDYYYY"
08	Station license expired	"Clear" or "Locked - MMDDYYYY"
09	Failure to pay for cert. numbers purchased	"Clear" or "Locked - MMDDYYYY"
10	Failure to pay for communications services	"N/A" (see NOTE)
11	Certificate sequencing error	"N/A" (see NOTE)
12	50 (Variable Number set by the VID) Georgia Emission Tests (running total) performed without communications within XXX hours	"Clear" or "Locked - MMDDYYYY"
13	VRT Corrupt	“Clear” or “Locked - MMDDYYYY”
14	ESC_ASM.DAT Corrupt	“Clear” or “Locked - MMDDYYYY”

NOTE: Error codes 05, 10, and 11 are not used in Georgia and should always be "clear". The GAS is to ignore bits in fields 5, 10, and 11 for the purpose of lockouts.

These lockouts shall be locked/cleared by the VID or from the QA/State menu. The file structure is shown in Appendix C

The acceptable abbreviations for Field #l are as follows:

01. State Lockout
02. ASM lockout
03. Cabinet Tamper
04. State Disk Drive
05. Cert Area Tamper
06. Station lic suspend
07. Station lic revoke
08. Station lic expire
09. Fail to pay cert
10. Fail to pay comm.
11. Cert sequence error
12. Too many SC
13. VRT Corrupt
14. ESC_ASM Corrupt

Section 5 - Vehicle Inspection Report and Printer Functions

5.01 Vehicle Inspection Report (VIR)

(1) The VIR shall be generated after "end-of-test" contact with the VID for failing or paid aborted tests. Passing test results shall be transmitted to the VID during the next "Beginning-of –Test contact.

(2) The Vehicle Inspection Report (VIR) shall display the information shown in the following samples.

(a) The following title shall be printed on all VIRs.

"GEORGIA VEHICLE EMISSION INSPECTION REPORT"

(b) The "Public Awareness Statement" shown below shall be printed on the VIR:

"The Georgia Emission Test Program is helping to clean up Atlanta's air - and you are doing your part. Motor vehicles are driven over 115 million miles each day in Atlanta and are responsible for half of the pollutants in Atlanta's air. Keeping your vehicle tuned up and in good operating condition is the most important thing you can do to keep our air clean and protect the health of all our citizens".

(c) The Overall Test Results Section of the VIR shall be formatted as shown in the example VIRs shown below. It is EPD's intention to have VIRs appear as similar as possible regardless of analyzer manufacturer. A single horizontal line shall divide each section of the report. Top and bottom margins of 0.75 inches and left and right margins of 0.50 inches shall be used. Print size (12 or 15 point), justification (left or center), bold or regular print, and the relative position of individual fields within each section shall match the examples. Manufacturers may make minor adjustments to print size and field location where needed to allow the VIR to be printed on a single 8.5" by 11.0" sheet.

1. Under the "**Overall Test Result**" heading, the following items will be printed.

(i) Test result - "**Passed**", "**Failed**", or "**Aborted**". For aborted or failed/aborted tests, the abort code and a brief description shall be displayed.

(ii) Certificate number - A certificate number shall be displayed for all passed tests, paid aborts, and failed tests. No certificate number will be displayed for unpaid aborted tests. For unpaid retests, the certificate number will be followed by the notation "**RETEST**".

(iii) An information message:

For passed vehicles - " **Keep a copy for your records**".

For failed vehicles –

"**Your vehicle failed the inspection. Repairs are needed to reduce emissions. You MUST present a completed repair form and this report to obtain a reinspection. Read the "Failed Vehicle" pamphlet for information on repairs and possible warranty coverage for your vehicle**."

For aborted tests –

"**The inspection was not completed for the reason listed above. Present this report when a new test is performed**"

(iv) Test time - date in MMDDYYYY format, followed by time in hh:mm format on a 24-hour clock.

(v) Test type - "**Initial**", "**After Repairs**", or "**Referee**".

(vi) Test fee - Dollar amount "**$XX.XX**" or "**FREE**"

(d) Vehicle Information Section

The following information shall be displayed in the format shown in the examples:

- Vehicle License
- State
- Vehicle Identification Number
- Model year
- Make
- Model
- Test Standards Type (Car or truck or grandfathered)
- Engine size
- Cylinders
- Transmission
- GVW Rating
- Test ID
- Odometer reading
- Body Type
- Dilution Correction Factor
- Test weight
- VRT Record Number

NOTE: Test ID shall only be printed on PASSING and Paid Abort VIRs {see 5.03.1}.

(e) The emission test results shall be displayed in the Emission Test Results Section as follows*:*

For the two-speed idle test -

For both the 2500 rpm test and the idle portions of the test, for **HC, CO, RPM** and **CO+CO_2** levels, the dilution corrected reading, the allowable and a "**Pass**" or "**Fai**l" result shall be displayed for all tests except as noted below:

For the ASM test -

The **HC, CO, NO, RPM,** and **CO + CO_2** corrected reading, allowable readings and a "**PASS**" or "**FAIL**" result, except as noted below:

Exceptions: For aborted tests, allowable levels will be displayed, but no HC or CO or NO readings and no pass or fail indication will be shown. RPM and CO+CO_2 readings will also be shown if available, along with allowable levels. A "fail" shall be indicated if that was the reason for the test being aborted.

For after repairs tests where the previous test was failed due to a only missing catalytic

converter or leaking fuel cap (i.e., the tailpipe results were passing), the HC, CO, RPM and $CO+CO_2$ results will be shown as "pass", but no readings or allowable emission values will be shown. No value will be shown for the Dilution Correction Factor.

Results of the catalytic converter inspection shall be displayed as "**Present**", "**Fail**", or "**Not applicable**".

Results of the fuel cap leak test shall be displayed as "**Pass**" or "**Fail**". If the inspection is aborted during the emission test and no fuel cap result is obtained, the fuel cap result will be left blank on the VIR.

For after repair tests, the results from the previous test will be used for the catalytic converter and fuel cap test, unless the vehicle failed those tests. In that case, the results of this reinspection will be displayed.

(f) Station Information Section

1. This section will contain the following station information:

    - Station number
    - Station name
    - Station address
    - Inspector number
    - Inspector name

2. This section will also contain the following certification statement:

"I certify that this test was conducted in accordance with all applicable Georgia test requirements", and an inspector's Signature space."

(g) OBD and Recall Section For all 1996 and newer model vehicles tested, the results of the OBD check shall be shown. The VIR shall include a line "**On-Board Diagnostic Results** – For vehicles with DTCs causing the MIL to be illuminated the following message may be printed:" **These problems may adversely affect your vehicle's emissions and should be corrected**" followed by a listing of all emission related fault code numbers and the short description of the fault. For vehicles with no fault codes found, a statement "**No Fault Codes Found**" shall be entered instead of the listing of codes.

For vehicles that fail the emission portion of the inspection, a listing of any recall notices transmitted for the vehicle shall be printed.

(h) Other requirements

1. A vehicle inspection report shall be printed every time a test is performed regardless of the test result.

2, VIRs issued when the analyzer is in the training mode shall print the following in bold, large type, at the top and bottom of the report, and next to the Emission Results and the Overall Results:

TRAINING MODE: NOT A VALID REPORT

3. For all VIRs that are reprinted from recalled vehicle information, the VIR shall be identical to the original VIR, except that a notation "**REPRINT**" shall be

displayed immediately above the Certificate number line, and in the same size font.

4. Reprints that are for newer vehicles that had a random TSI test as indicated by the "6" in the "REASON TSI TESTED" field of the GAS.DAT shall not print the gas values recorded in the GAS.DAT.

5.02 Example Vehicle Inspection Reports

The following pages show examples of Georgia Vehicle Inspection Reports (VIRs). These VIRs are shown for the purpose of visually understanding what information is required on the document given to the motorist. The format may be modified as a consensus is formed during the development of the final software delivered to the state, however these changes are expected to be minor.

GEORGIA VEHICLE EMISSIONS INSPECTION REPORT

The Georgia Emission Test Program is helping to clean up Atlanta's air – and you are doing your part. Motor vehicles are driven over 115 million miles each day in Atlanta and are responsible for half of the pollutants in Atlanta's air. Keeping your vehicle tuned up and in good running condition is the most important thing you can do to keep our air clean and protect the health of all our citizens.

OVERALL TEST RESULT: FAIL **CERTIFICATE NUMBER: CA000101**

Your vehicle failed the inspection. Repairs are needed to reduce emissions. You MUST present a completed repair form and this report to obtain a re-inspection.

Read the "Failed Vehicle" pamphlet, ask the inspector to view the Repair Watch Report, and contact your service professional for possible warranty coverage for your vehicle.

Test Date/Time: 09/17/2001 @ 16:50 Test Type: Initial Test Fee: $25.00

Vehicle Information

VIN:	1GNEK18K6XJ311925				
License:	ABC123	State:	Georgia	Stds. Type:	Passenger
Year:	1999	Make:	Chevrolet	Model:	Cavalier
Cylinders:	4	Engine Size:	2.1 L	Transmission:	Automatic
Odometer:	37122	Body Type:	Sedan	Test Weight:	3102
GVW Rating		VRT Record:	40158	~~Test ID:~~	

ASM EMISSION TEST RESULTS

	25/25 Test			50/15 Test		
	Reading	Allowed	Result	Reading	Allowed	Result
HC ppm	122	74	Fail	198	120	Fail
CO %	0.33	0.49	Pass	0.10	0.51	Pass
NO_x ppm	70	861	Pass	85	1001	Pass
RPM	1200	2750 max		1179	1200 max	
$CO+CO_2$%	10.8	6.0 min		9.9	6.0 min	

		Fuel Cap 1 Test	Fail
Catalytic Converter	Present	Fuel Cap 2 Test	None

Station Number: GA000000 InspectorName:Joe Emission
Joe's Emission Test Inspector Number: AA692586
2500 Roswell Road Software Version: GA004.3
Alpharetta, GA 30044 GAS Unit Number: XX000000
Telephone Number: 770-356-7894

I certify that this test was conducted in accordance with all applicable Georgia test requirements.

Inspector's Signature: _____

GEORGIA VEHICLE EMISSIONS INSPECTION REPORT

The Georgia Emission Test Program is helping to clean up Atlanta's air – and you are doing your part. Motor vehicles are driven over 115 million miles each day in Atlanta and are responsible for half of the pollutants in Atlanta's air. Keeping your vehicle tuned up and in good running condition is the most important thing you can do to keep our air clean and protect the health of all our citizens.

OVERALL TEST RESULT: PASS **CERTIFICATE NUMBER: CA000103 RETEST**

Keep a copy for your records.

Test Date/Time: 09/17/2001 @ 09:25 Test Type: After Repairs Test Fee: Free

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Vehicle Information

VIN: 1GNEK18K6XJ311925

License:	ABC123	State:	Georgia	Stds. Type:	Passenger
Year:	1999	Make:	Chevrolet	Model:	Cavalier
Cylinders:	4	Engine Size:	2.1 L	Transmission:	Automatic
Odometer:	37122	Body Type:	Sedan	Test Weight:	3102
GVW Rating		VRT Record:	40158	Test ID:	204669575

ASM EMISSION TEST RESULTS

	25/25 Test			50/15 Test		
	Reading	Allowed	Result	Reading	Allowed	Result
HC ppm	52	74	Pass	88	120	Pass
CO %	0.33	0.49	Pass	0.10	0.51	Pass
NO_X ppm	70	861	Pass	85	1001	Pass
RPM	1200	2750 max		1179	1200 max	
$CO+CO_2$%	10.8	6.0 min		9.9	6.0 min	

		Fuel Cap 1 Test	Pass
Catalytic Converter	Present	Fuel Cap 2 Test	None

Station Number: GA000000
Joe's Emission Test
2500 Roswell Road
Alpharetta, GA 30044
Telephone Number: 770-356-7894

Inspector Name: Joe Emission
Inspector Number: AA692586
Software Version: GA004.3
GAS Unit Number: XX000000

I certify that this test was conducted in accordance with all applicable Georgia test requirements.

Inspector's Signature: _____

GEORGIA VEHICLE EMISSIONS INSPECTION REPORT

The Georgia Emission Test Program is helping to clean up Atlanta's air – and you are doing your part. Motor vehicles are driven over 115 million miles each day in Atlanta and are responsible for half of the pollutants in Atlanta's air. Keeping your vehicle tuned up and in good running condition is the most important thing you can do to keep our air clean and protect the health of all our citizens.

OVERALL TEST RESULT: PASS **CERTIFICATE NUMBER: CA000103 RETEST**

Keep a copy for your records.

~~Test Date/Time: 09/17/2001 @ 09:25 Test Type: After Repairs Test Fee: Free~~

Vehicle Information

License:	ABC123	State:	Georgia	VIN:	1GNEK18K6XJ311925
Year:	1999	Make:	Chevrolet	Model:	Cavalier
Cylinders:	4	Engine Size:	2.1 L	Transmission:	Automatic
Odometer:	37122	Body Type:	Sedan	Stds. Type:	Passenger
GVW Rating		VRT Record:	40158	Test ID:	204669575

TWO SPEED IDLE EMISSION TEST RESULTS

	2500 RPM Test			**IDLE RPM Test**		
	Reading	Allowed	Result	Reading	Allowed	Result
HC ppm	52	74	Pass	88	120	Pass
CO %	0.33	0.49	Pass	0.10	0.51	Pass
RPM	2485	2750 max		989	1200 max	
$CO+CO_2$%	10.8	6.0 min		9.9	6.0 min	

		Fuel Cap 1 Test	Pass
		Fuel Cap 2 Test	None
Catalytic Converter	Present		

Station Number: GA000000	Inspector Name: Joe Emission
Joe's Emission Test	Inspector Number: AA692586
2500 Roswell Road	Software Version: GA004.3
Alpharetta, GA 30044	GAS Unit Number: XX000000
Telephone Number: 770-356-7894	

I certify that this test was conducted in accordance with all applicable Georgia test requirements.

Inspector's Signature: _____

GEORGIA VEHICLE EMISSIONS INSPECTION REPORT

The Georgia Emission Test Program is helping to clean up Atlanta's air - and you are doing your part. Motor vehicles are driven over 115 million miles each day in Atlanta and are responsible for half of the pollutants in Atlanta's air. Keeping your vehicle tuned up and in good running condition is the most important thing you can do to keep our air clean and protect the health of all our citizens.

OVERALL TEST RESULT: PASS **CERTIFICATE NUMBER: CA000110**

Keep a copy for your records.

Test Date/Time: 09/17/2001 @ 09:25 Test Type: Initial TestFee: $25.00

Vehicle Information

License:	ABC123	State:	Georgia	VIN:	3MNEK18K6XJ311925
Year:	1989	Make:	Mercedes Benz	Model:	450SL
Cylinders:	6	Engine Size:	4.0 L	Transmission:	Automatic
Odometer:	98201	Body Type:	Sedan	Stds.Type:	Grandfathered
GVW Rating		VRT Record:	35026	Test ID:	204669888

TWO SPEED IDLE EMISSION TEST RESULTS

	2500 RPM Test			IDLE RPM Test		
	Reading	Allowed	Result	Reading	Allowed	Result
HC ppm	52	74	Pass	88	120	Pass
CO %	0.33	0.49	Pass	0.10	0.51	Pass
RPM	2485	2750 max		989	1200 max	
$CO+CO_2$%	10.8	6.0 min		9.9	6.0 min	

		Fuel Cap 1 Test	Pass
Catalytic Converter	Present	Fuel Cap 2 Test	None

Station Number: GA000000
Joe's Emission Test
2500 Roswell Road
Alpharetta, GA 30044
Telephone Number: 770-356-7894

Inspector Name: Joe Emission
Inspector Number: AA692586
Software Version: GA004.3
GAS Unit Number: XX000000

I certify that this test was conducted in accordance with all applicable Georgia test requirements.

Inspector's Signature: _____

5.03 Validation Number

(1) An algorithm for establishing the Test ID number will be provided to manufacturers separately.

(a) The Test ID shall be printed ONLY on the all passing VIRs, failing VIRs~~,~~ and paid aborts shell not have a TEST ID printed on the VIR.

(b) The Test ID shall not be printed on non-paid aborts, the words "NO TEST" shall be printed in the test ID space.

(2) Transmit Test Records

(a) Any test record that the GAS has created in accordance with "Vehicle Test Record Format" shall be transmitted to the VID.

(b) The GAS shall display the following message:

TRANSMITTING DATA, PLEASE WAIT.

[Display 5.03 (1)]

Programming Criteria

a. The GAS shall transmit all vehicle test records with Overall Test Result of "P" (for Pass), "F" (for Fail) or "A" (for Abort), or “R” (for REJECT) from the file GAS.DAT to the VID. The first record transmitted will be the oldest. After successful transmission, only the records successfully transmitted shall be moved from GAS.DAT to GAS.HST. The GAS shall retain a minimum of the most recent one thousand (1,000) test records in the GAS.HST file.

b. If successful communications cannot be achieved and the GAS has not exceeded the number of inspections allowed without VID communication, the GAS shall proceed with the Georgia Emission Test.

CANNOT ACCESS NETWORK. YOU MAY PROCEED WITH THE GEORGIA EMISSIONS TEST.

[Display 5.03 (2)]

(3) Transmit Calibration Records: Any calibration records that the GAS has created in accordance with Section 4.02 "Calibration Test Data" shall be transmitted to the VID.

The GAS shall display the following message:

TRANSMITTING DATA PLEASE WAIT.

[Display 5.03 (1)]

Programming Criteria

(a) The GAS shall transmit all records from the file CAL.DAT to the VID. The first record transmitted will be the oldest. After successful transmission, the GAS shall delete all

of the calibration records from the CAL.DAT file.

(b). If successful communication/transmission cannot be achieved and the GAS has not exceeded the number of inspections allowed without VID communication, the GAS shall proceed with the Georgia Emission Test inspection. The GAS shall display the following message:

CANNOT ACCESS NETWORK. YOU MAY PROCEED WITH THE GEORGIA EMISSION TEST.

[Display 5.03 (3)]

5.04 Abort Code Entry

The inspector shall be required to enter the appropriate escape code when it is needed. The explanation for the code shall be included with the TEST RESULTS.

5.05 Emission Repair Form

The GAS shall print the following repair form if the vehicle fails the Georgia Enhanced I/M inspection prior to printing the Georgia VIR. The following information shall be populated by the GAS: test date, certification number, license, state, VIN, year, make, model, cylinders, engine size, transmission, and odometer reading. See attached EMISSION REPAIR FORM.

TWO LINES OF BOLD 20-POINT COURIER NEW

½ inch margins around

Fifteen lines of 10-point Courier New
Text will come from MESSAGE.DAT

One line of 11-point Courier New

Six lines of 10-point Courier New

One line of 18-point Courier New

Eight lines of 12-point Courier New

One line of 10-point Courier New
Two 12-point blank lines
One line of 12-point Courier New
□
Four 10-point Courier New blank lines

One line of 18-point Courier New
One line of 10-point Courier New followed by one 10-point Courier New blank line
One line of 12-point Courier New followed by one 12-point blank line

Ten lines of 10-point Courier New

One line of 18-point Courier New
One line of 11-point Courier New
Four lines of 10-point Courier New

One line of 10-point Courier New followed by one 10-point blank line
□ One line of 14-point Courier New

THIS EMISSION REPAIR FORM MUST BE COMPLETED BEFORE RETESTING

In order to have your vehicle re-inspected (free or paid), this Emission Repair form MUST be completed and presented to the inspector. Under no circumstance is a vehicle to be re-inspected without a completed form. It is a violation for the inspector to re-inspect vehicles without a completed form.

Before any repairs are paid for, you should make certain your mechanic will complete this form so you can receive your re-inspection.

For each paid inspection performed on your vehicle you are entitled to one FREE re-inspection, if you return to the same inspection station within 30 days. Note: The initial test date is day 1.

EMISSION STATION OWNERS MUST RETAIN THIS COMPLETED FORM AND SUBMIT TO GCAF. VEHICLE OWNERS ARE TO RETAIN REPAIR RECEIPTS.

Test Date:	09/17/2001 @ 16:50			Certificate Number:	CA123456
Station Name:	ABC Emissions			Station Number:	GA123456
License:	ABC1234	State:	Georgia	VIN:	1GNEK18K6XJ311925
Year:	1999	Make:	Chevrolet	Model:	Cavalier
Cylinders:	4	Engine Size:	2.1 L	Transmission:	Automatic
Odometer:	123456	Body Type:	Sedan	Stds Type:	Passenger
GVW Rating:	……	VRT Record:	40158	Test Weight:	4321

Section A: REPAIR SHOP INFORMATION

The Repair Shop Technician is to complete Sections A & B.

Repair Shop Phone #: ____ ____ ____ - ____ ____ ____ - ____ ____ ____ ____

Total Cost of PARTS:$_____.00 (enter whole dollars only)

Total Cost of Labor:$_____.00 (enter whole dollars only)

☐ Check if other emission related repairs were recommended but not performed.

Repair Technician Signature:_____

Section B: REPAIR CATEGORIES (Date and circle all that apply)

Repair Categories Repair Date:_____

1	Ignition Repairs	6	Sensors, Switches and Computer
2	Intake/Fuel Induction System Repair	7	Catalytic Converter / Exhaust System
3	Engine Diagnostics	8	Air Injection System Repair
4	Fuel – Cap/Tank/Evaporative System	9	Internal Engine Repairs
5	EGR System	10	Other ASM or OBD related repairs

Section C: OWNER SELF-REPAIR

For self-repairs, the Owner is to complete Sections B & C.

Total Cost of PARTS ONLY $_____.00 (enter whole dollars, NO labor allowed)

Vehicle Owners Signature:_____

☐ I choose to have my vehicle re-inspected WITHOUT making any repairs.

Georgia's Clean Air Force Consumer Hot Line #1-800-449-2471

Section 6 - Hardware and Test Standards

6.01 ASM Short Test Standards and Calculations

1. ASM Emissions Standards:

   a. ASM Start-up Standards: STANDARDS BASED ON EPA

2. ASM Test Score Calculation

   (a). Exhaust gas measurement calculation.

   1. System Response Time: The analysis and recording of exhaust gas concentrations shall begin 12 seconds after the applicable test mode begins, or sooner if the system response time is less than 12 seconds. The analyzing and recording of exhaust gas concentrations shall not begin sooner that the time equivalent to the response time of the slowest transducer. The emissions data will be time-aligned with the vehicle speed readings to account for the delay caused by transport time needed for exhaust gas to get from the vehicle's tailpipe to the analyzers/sensors. This transport time may be different from the probe to the optical bench and from the probe to the to the NO and O_2 sensors and shall be accounted for. Time alignment shall be done before any corrections (e.g., DCF, humidity) are applied.

   2. Sample Rate: Exhaust gas concentrations shall be analyzed at a minimum rate of once per second.

   3. Emission measurement calculations: Partial stream (concentration) emissions shall be calculated based on a running 10-second average. The values used for HC(j), CO(j), and NO(j) are the raw (uncorrected) tailpipe concentrations.

      (i) $AvgHC = \Sigma_{j=1 \text{ to } 10} HC(j)*DCF(j)/10$

      (ii) $AvgCO = \Sigma_{j=1 \text{ to } 10} CO(j)*DCF(j)/10$

      (iii) $AvgNO = \Sigma_{j=1 \text{ to } 10} NO(j)*DCF(j)/10$

   4. Dilution Correction Factor: The analyzer software shall multiply the raw emissions values by the Dilution Correction Factor (DCF) during any valid ASM emissions test. The DCF accounts for exhaust sample dilution (either intentional or unintentional) during an emissions test. The analyzer software shall calculate the DCF using the following gasoline fuel formula. If the calculated DCF exceeds 3.0 then a default value of 3.0 shall be used. The gas values used in the calculations below shall be raw gas readings.

      (i) $X=[CO_2]_{measured} / [CO_2]_{measured} + [CO]_{measured}$

      Where $[CO_2]_{measured}$ and $[CO]_{measured}$ are the instantaneous ASM emissions test readings.

      (ii) Calculate $[CO_2]_{adjusted}$ using the following formula.

For Gasoline: $[CO_2]_{adjusted} = (X / 4.644+1.88X)*100$

(iii) Calculate the DCF using the following formula.

$DCF = [CO_2]_{adjusted} / [CO_2]_{measured}$

5. For ASM test, the HCF shall be calculated using the following formula:

K_h = NO humidity correction factor (Revised Method).

(i) Kh = e^(0.004977(H-75)-0.00444(T-75)).

(ii) H = Absolute humidity in grains of water per pound of dry air.

(iii) T = Temperature in degrees Fahrenheit.

NOTE: If the calculation of Kh results in 2.19 or greater, the value of 2.19 shall be used.

(b) Pass/fail determination: A pass or fail determination shall be made for each applicable test mode based on a comparison of the applicable short test standards and the measured value for HC, CO, and NO as described in paragraph (2)(a)3 of this section. A vehicle shall pass the test mode if the emission values for HC, CO, and NO are simultaneously equal to or below the applicable short test standards for all three pollutants. A vehicle shall fail the test mode if the values for HC, CO, or NO, or any combination of the three, are above the applicable standards at the expiration of the test time.

6.02 ASM Short Test Sequence

(1) General Requirements

(a) Vehicle Characterization.

1. Vehicle type: LDGV, LDGT1, LDGT2, and others as needed;

2. Chassis model year;

3. Make;

4. Model;

5. Number of cylinders;

6. Cubic inch or liter displacement of the engine;

7. Transmission type; and

8. Equivalent Test Weight.

(b) Ambient Conditions: The ambient temperature, relative humidity, and barometric

pressure shall be recorded continuously during the test cycle or as a single set of readings up to 4 minutes before the start of the driving cycle.

(c) Restart: If shut off, the vehicle shall be restarted as soon as possible before the test and shall be running at least 30 seconds prior to the start of the ASM driving cycle.

(d) Void Test Conditions: The test shall immediately end and any exhaust gas measurements shall be voided if the vehicle's engine stalls at any time during the test sequence.

(e) Test Time Limit: The test shall end upon reaching the overall maximum test time.

(2) Pre-inspection and Preparation

(a) Emission Sample System Purge/Hang-Up: While a lane is in operation, the sample system shall be continuously purged after each test for at least 15 minutes if not taking measurements. If the HC reading, when the probe is sampling ambient air, exceeds 7 ppm C6 on an instantaneous measure, testing shall be prohibited. Testing may proceed after a determination is made that hang-up is less than 7 ppm C6 (i.e., by eliminating the ambient background contribution to the measurement). Note: This emission sample system purge and HC hang-up procedure is to be used for TSI testing also.

(b). Roll Rotation: The vehicle shall be maneuvered onto the dynamometer with the drive wheels positioned on the dynamometer rolls. Prior to restraining the vehicle and test initiation, the rolls shall be rotated until the vehicle laterally stabilizes on the dynamometer. Vehicles that cannot be stabilized on the dynamometer shall be rejected from testing. Drive wheel tires shall be dried if necessary to prevent slippage.

(c) Cooling System: When ambient temperatures exceed 50°F, testing shall not begin until the cooling system is positioned and activated. The cooling system blower shall be positioned to direct air to the vehicle cooling system, but shall not be directed at the catalytic converter.

(d) Vehicle Restraint: Testing shall not begin until the vehicle is restrained. Any restraint system shall meet the requirements of Section 6.03(1)(e)(ii). In addition, the parking brake shall be set for front wheel drive vehicles prior to the start of the test, unless parking brake functions on front axle or if is automatically disengaged when in gear.

(e) Dynamometer Warm-Up: The dynamometer shall be in a warmed-up in accordance with the manufacturer's recommended procedure. This procedure may include temperature correcting compensation circuits for all ambient temperature conditions.

(f) Analyzer Warm-Up: The analyzer shall reach stability in less than 30 minutes at 41 degrees F from startup. An emissions test shall not begin before the analyzer has been adequately warmed up. The analyzer will be considered warmed-up when the zero and span readings for all pollutants have stabilized within the required accuracy range for 5 minutes without adjustment. Warm-up verification using continuous flow of span gas is not required.

6.03 ASM Short Test Equipment

(1) Dynamometer Specifications.

(a) General Requirements

1. Capacity: The dynamometer structure (e.g., bearings, rollers, pit plates, etc.) shall accommodate all light-duty vehicles and light-duty trucks up to 8,500 pounds GVWR.

2. ASM Load: Dynamometer ASM2 load horsepower shall be automatically selected based on the vehicle parameters in the test record.

3. Alternative Design: Alternative dynamometer specification or designs may be allowed upon a determination by the Administrator that, for the purpose of properly conducting an approved short test, the evidence supporting such deviations will not cause improper vehicle loading.

(b) Power Absorption.

1. Vehicle Loading: The vehicle loading used during the ASM driving cycles shall follow the equation in paragraph (a)(2)(ii) at 25 mph. Unless otherwise noted, any horsepower displayed during testing shall be $HP2525_{yy}$.

2. HP Calculation

$$IHPxxxx_{yy} = THPxxxx - PLHP_{zz\text{-}yy} - GTRL_{@zz\ mph\ -\ yy}$$

$$Hpxxxx_{yy} = IHPxxxx_{yy} + PLHP_{zz\text{-}yy}.$$

3. Range of Power Absorber: The range of the power absorber shall be sufficient to test all light-duty vehicles and light-duty trucks up to 8,500 pounds GVWR, using ASM2525 and ASM5015. The absorption shall be adjustable in 0.1 hp increments at 15 MPH and 25 MPH.

4. Parasitic Losses: The parasitic losses (PLHP) in each dynamometer system (such as windage, bearing friction, and system drive friction) shall be characterized at 25 and 15 mph upon initial acceptance and during each dynamometer calibration if required.

5. Power Absorber: Only electric power absorbers shall be used.

6. Power Absorber Accuracy: The accuracy of the power absorber shall 3.75 pounds of wheel force at 25 mph or ±2% of required wheel force, whichever is greater, in direction of rotation.

(c) Rolls

1. Size and Type: The dynamometer shall be equipped with twin rolls. The rolls shall be coupled side-to-side. In addition, the front and rear rolls shall be coupled. The dynamometer roll diameter shall be 8.65 inches (±.25"). The spacing between the roll centers shall comply with the equation in paragraph 6.03(1)(c)(ii) to within 0.5 inches and -0.25 inches of the calculated value. The parasitic power losses shall be determined as indicated in Section 6.05(2)(a)(iv). Fixed dynamometer rolls shall have an inside track width of no more than 30 inches and outside track width of at least 100 inches. Rolls moveable from side-to-side may be used if adequate measures are taken to prevent tire damage from lateral vehicle movement and the dynamometer

sufficiently accommodates track widths of the full range of vehicles to be tested on the dynamometer. Alternative coupling methods, track widths, roll sizes, and number of rolls may be used if approved by the State and the Administrator.

2. Roll Spacing: Roll Spacing = (24.375+D) * Sin 31.5153. D = dynamometer roll diameter. Roll spacing and roll diameter are expressed in inches.

3. Design: The roll size, surface finish, and hardness shall be such that tire slippage is minimized under all weather conditions; that water removal is maximized; that the specified accuracy of the distance and speed measurements are maintained; and that tire wear and noise are minimized.

4. Inertia: The dynamometer shall have a total test inertia weight of 2000 pounds ±40 pounds. Any deviation from the 2000-pound base inertia shall be quantified and the coast-down time shall be corrected accordingly. Any deviation from the stated inertia shall be quantified and the inertia simulation shall be corrected accordingly.

5. Electrical Inertia Simulation: Electrical inertia-simulation may be used provided the performance of the electrically simulated inertia complies with the following specifications. Exceptions to these specifications may be allowed upon a determination by the Administrator that such exceptions would not significantly increase vehicle loading or emissions for the purpose of properly conducting an approved short test.

(i) System Response. The torque response to a step change shall be at least 90% of the requested change within 300 milliseconds after a step change is commanded by the dynamometer control system, and shall be within 2% of the commanded torque by 300 milliseconds after the command is issued. Any overshoot of the commanded torque value shall not exceed 25% of the torque value.

(ii) Simulation Error. An inertia simulation error (ISE) shall be continuously calculated any time the actual dynamometer speed is between 10 mph and 60 mph. The ISE shall be calculated by the equation in Section 6.03(1)(d)(ii)(C), and shall not exceed 3% of the inertia weight selected (IWS) for the vehicle under test.

(I) $ISE = [(IW_s - I_t) / (IW_s)] * 100$

(II) $I_t = I_m + 1/V \int_0^t (Fm - Frt)\, dt$

Where:

I_t = Total inertia being simulated by the dynamometer (kg)

I_t (lb force) = I_t (kg) * 2.2046

I_m = Base (mechanical inertia of the dynamometer (kg)

V = Measured roll speed (m/s)

F_m = Force measured by the load cell (translated to the roll surface) (N)

F_{rl} = Road load force (N) required by IHPxxxx$_{yy}$ at the measured roll speed (V)

t = Time (sec)

(d) Other Requirements.

1. Vehicle Speed and Speed Response: The measurement of roll speed shall be accurate within 0.1 mph between speeds of 10 and 30 mph. The dynamometer controller shall be able to detect and resolve speed variations in less than 500 milliseconds to 0.10 mph/sec accuracy.

2. Vehicle Restraint: The vehicle shall be restrained during the ASM driving cycle. The restraint system shall be designed to insure that vertical and horizontal force on the drive wheels does not significantly affect emission levels. The restraint system shall allow unobstructed vehicle ingress and egress and shall be capable of safely restraining the vehicle under all reasonable operating conditions.

3. Vehicle Cooling: The test system shall prompt the inspector to use a cooling fan so not to overheat the vehicle under test when the ambient temperature measured by the on-board weather station exceeds 50°F.

4. All-Wheel Drive: If used, four-wheel drive dynamometers shall insure the application of correct vehicle loading as defined in paragraph (a)(2) of this section and shall not damage the four-wheel drive system of the vehicle. Front and rear wheel rolls shall be coupled and maintain speed synchronization within 0.2 mph. The four- wheel drive system shall be able to uncouple the rear roll set so as to function as a two wheel drive system.

5. Installation: In all cases, installation must be performed so that the test vehicle is approximately level (± 5°) while on the dynamometer during testing.

(2) Emission Sampling System

(a). Materials and Design: The sampling system shall be designed to insure durable, leak-free operation and be easily maintained. Materials that are in contact with the gases sampled shall not contaminate or change the character of the gases to be analyzed, including gases from vehicles not fueled by gasoline. The system shall be designed to be corrosion-resistant and be able to withstand typical vehicle exhaust temperatures when the vehicle is driven through the test cycle for 180 seconds.

(b) Sampling System: The sampling system shall draw exhaust gas from the vehicle, shall remove particulate matter and aerosols from the sampled gas, shall drain condensed water from the sample if necessary, and shall deliver the resultant gas sample to the analyzers/sensors for analysis and then deliver the analyzed sample outside the building. The sampling system shall, at a minimum, consist of a tailpipe probe, flexible sample line, water removal system, a particulate trap, sample pump, and flow control components.

(c) Sample Probe(s).

1.Insertion: The sample probe(s) shall allow for at least a 16-inch insertion depth of the sample point into the vehicle's exhaust, and be made out of a flexible material

for the first 12 inches, as well as have a positive means of retention to secure the probe(s) in the tailpipe of vehicles. In addition, the probe(s) shall be inserted at least 10 inches into the vehicle's exhaust when testing vehicles. All GAS units will be equipped with dual anti dilution probes, to sample exhaust systems that utilize exhaust baffles. Use of a tailpipe extension is permitted as long as the extension does not change the exhaust backpressure by more than one inch of water pressure.

2. Retention: The probe(s) shall incorporate a positive means of retention to prevent slipping out of the tailpipe during use.

3. Flexibility: The probe(s) shall be designed so that the tip extends at least 10 inches into the tailpipe.

4. Probe Tip: Probe tips shall be designed and constructed to prevent sample dilution. The probe tip(s) shall be shielded so that debris is not scooped up by the probe(s) when it is inserted into the tailpipe.

5. Materials: All materials in contact with exhaust gas prior to and throughout the measurement portion of the system shall be unaffected by and shall not affect the sample (i.e., the materials shall not react with the sample, and they shall not taint the sample). Acceptable materials include stainless steel, Teflon, silicon rubber, and Tedlar®. Dissimilar metals with thermal expansion factors of more than 5% shall not be used in either the construction of probes or connectors. The sample probes shall be constructed of stainless steel or other non-corrosive, non-reactive material that can withstand exhaust GAS temperatures at the probe tip of up to 1,100°F.

6. System Hoses and Connections: Hoses and all other sample handling components must be constructed of, or plated with a non-reactive, non-corrosive, high temperature material which will not affect, or be affected by, the exhaust constituents and tracer gases.

7. Dual Exhaust: The sample system shall provide for the testing of dual exhaust equipped vehicles. When testing a vehicle with functional dual exhaust pipes, a dual sample probe identical in design (as verified by the management contractor during the certification process) will be provided by the analyzer manufacturer and must be used in the inspection of all dual exhaust vehicles. Probes shall be designed to provide equal flow in each leg. The equal flow design requirement is met if the flow rate in each leg of the probe has been measured using two sample pump flow rates (the normal rate and a rate equal to the onset of low flow). If the flow rates in each of the legs are found to be equal to each other (within 15% of the flow rate in the leg having lower flow).

(d) Particulate Filter: The particulate filter shall be capable of trapping 97% of all particulate and aerosols 5 microns or larger. The filter element shall not absorb or adsorb hydrocarbons. The filter housing shall be transparent or translucent to allow the operator to observe the filter element's condition without removing the housing. The filter element shall be easily replaceable and shall provide for reliable sealing after filter element changes.

(e) Water Trap: The water trap shall be sized to remove exhaust sample water from vehicles fueled with gasoline, reformulated Gasoline, alcohol blends or neat, and oxygenated fuels. The filter element, filter bowl, and housing shall be inert to these

fuels as well as to the exhaust gases from vehicles burning these fuels. The condensed water shall be continuously drained from the water trap's bowl. Sufficient water shall be trapped, regardless of fuel, to prevent condensation in the sample system or in the optical bench's sample cell.

(f) Low Flow Indication: The analyzer shall be prevented from performing an emissions test when the sample flow is below the acceptable level. The sampling system shall be equipped with a flow meter (or equivalent) that shall indicate sample flow degradation when measurement error exceeds 3% of the gas value used for checking, or causes the system response time to exceed 13 seconds to 90 percent of a step change in input (excluding NO), whichever is less.

(g) Exhaust Ventilation System (Not applicable to equipment manufacturers): The high quantities of vehicle emissions generated during loaded mode testing shall be properly vented to prevent buildup of hazardous concentrations of HC, CO, CO_2, and NO_x. Sufficient ventilation shall be provided in the station to maintain HC, CO, CO_2, and NO levels below OSHA standards.

1. Ventilation System: The ventilation system shall discharge the vehicle and analyzer exhaust outside the building.

2. Exhaust Collection System: The flow of the exhaust collection system shall not cause dilution of the exhaust at the sample point in the probe.

3. Exhaust Collection System Flow: The flow of the exhaust collection systems shall not cause a change of more than 1.0 inches of water pressure in the vehicle's exhaust system at the exhaust system outlet.

(3) Analytical Instruments.

(a) General Requirements.

1. Analyzers: The analyzer system shall consist of analyzers for HC, CO, NO, and CO_2, and digital displays for exhaust concentrations of HC, CO, NO, and CO_2, and for vehicle speed.

2. Alternative Analytical Equipment: Alternative analytic equipment specification, materials, designs, or detection methods may be allowed upon a determination by the Administrator, that for the purpose of properly conducting an approved short test, the evidence supporting such deviations will not significantly affect the proper measurement of emissions.

3. Sample rate: The analyzer shall be capable of measuring exhaust concentrations of gases specified in this section at a minimum rate of once per second.

(b) Performance Requirements.

1. Temperature Operating Range: The analyzer system and all associated hardware, including fuel cap testers, dynamometers, and OBD code scan tools, shall operate within the performance specifications described in Section 6.02 of this subpart at ambient air temperatures ranging from 41°F to 110°F. Analyzers shall be designed so that adequate airflow is provided around critical components to prevent overheating (and automatic shutdown) and to prevent the condensation of water vapor that could reduce the reliability

and durability of the analyzer. The analyzer system shall otherwise include necessary features to keep the sampling system within the specified range.

2. Humidity Operating Range: The analyzer system and all associated hardware, including fuel cap testers, dynamometers, and OBD code scan tools, shall operate within the performance specifications described in Section 6.02 of this subpart at a minimum of 85% relative humidity throughout the required temperature range.

3. Interference Effects: The interference effects for non-interest gases shall not exceed ±4 ppm for hydrocarbons, ±0.02% for carbon monoxide, ±0.20% for carbon dioxide, and ±20 ppm for nitric oxide when using the procedure specified in Section 06.04(4)(f)(iv). Corrections for collision broadening effects of combined high CO and CO_2 concentrations shall be taken into account in developing the factory calibration curves, and are included in the accuracy specifications.

4. Barometric Pressure Compensation: Barometric pressure compensation shall be provided. Compensation shall be made for elevations up to 6000 feet (above mean sea level). At any given altitude and ambient conditions specified in (iv) and (v), errors due to barometric pressure changes of ±2 inches of mercury shall not exceed the accuracy limits specified in paragraph (2).

5. System Lockout During Warm-up: Functional operation of the GAS-sampling unit shall remain disabled through a system lockout preventing the system from performing emission tests until the instrument meets stability and warm-up requirements. The instrument shall be considered "warmed up" when the zero and span readings for HC, CO, NO, and CO_2 have stabilized, within the accuracy values specified in Section 6.03(3)(b) for five minutes without adjustment.

6. Zero Drift Lockout: If zero or span drift cause the optical bench signal levels to move beyond the adjustment range of the analyzer, the system shall be prevented from performing an emissions test.

7. Electromagnetic Isolation and Interference: Electromagnetic signals found in an automotive service environment shall not cause malfunctions or changes in the accuracy in the electronics of the analyzer system. The instrument design shall ensure that readings do not vary as a result of electromagnetic radiation and induction devices normally found in the automotive service environment, including high energy vehicle ignition systems, radio frequency transmission radiation sources, and building electrical systems. Certification acceptance test described in Appendix B.

8. Vibration and Shock Protection: System operation shall be unaffected by the vibration and shock encountered under the normal operating conditions encountered in an automotive service environment.

9. Propane Equivalency Factor: The PEF range shall be between 0.470 and 0.560. For each audit/calibration point, the nominal PEF shall be conveniently displayed for the quality assurance inspector and other authorized personnel, in a manner acceptable to the program. If an optical bench must be replaced in the field, the manufacturer's Field Service Representative (FSR) shall change

any external labels to correspond to the nominal PEF of the new bench. The analyzer shall incorporate an algorithm relating PEF to HC concentration. Corrections shall be made automatically.

10. System Response Requirements: The response time from the probe to the display for HC, CO, and CO_2 analyzers shall not exceed 8 seconds for 90% of a step change in input. The response time for a step change in O_2 from 20.9% O_2 to 0.1% O_2 shall be no longer than 40 seconds. For NO analyzers, the response time shall not exceed 12 seconds for 90% of a step change in input. The response time for a step change in NO from a stabilized reading to 10% of that reading shall be no longer than 12 seconds.

(c) Detection Methods, Instrument Ranges, Accuracy, and Repeatability.

1. Hydrocarbon Analysis: Hydrocarbon (HC) analysis shall be determined by non-dispersive infrared (NDIR) analyzer. The analyzer shall cover at least the range of 0 ppm HC to 2000 ppm HC, where ppm HC is parts per million of hydrocarbon volume as hexane. The accuracy of the instrument between 1400 ppm HC and 2000 ppm HC shall be at least 5.0% of point. The accuracy of the instrument from 0-1400 ppm HC shall be ±4 ppm C6 or 3% of point, whichever is greater. The calibration curve must comply with the quality control specifications in Section 6.04(4)(b) for calibration curve verification.

2. Carbon Monoxide Analysis: Carbon monoxide (CO) analysis shall be determined by non-dispersive infrared (NDIR) analyzer. The analyzer shall cover at least the range of 0.00 % CO to 9.99% CO, where % CO is % volume CO. The accuracy of the instrument between 0.01% and 7.00% CO shall be ±3% or 0.02% CO, whichever is greater. The accuracy of the instrument between 7.01% and 10.00% shall be at least 5.0% of point. The calibration curve must comply with the quality control specifications in Section 6.04(4)(b) for calibration curve generation.

3. Carbon Dioxide Analysis: Carbon dioxide (CO_2) analysis shall be determined by non-dispersive infrared (NDIR) analyzer. The analyzer shall cover at least the range of 0.0 % CO_2 to 16.0% CO_2. The accuracy of the instrument between 0.01% and 16% CO_2 shall be at least ±0.3% CO_2 or 3% of point which ever is greater. The accuracy of the instrument between 16.01% and 18% shall be at least 5.0% of point. The calibration curve must comply with the quality control specifications in 4(d)(2) for calibration curve generation.

4. Nitric Oxide Analysis: The analyzer shall cover at least the range of 0 ppm NO to 5000 ppm NO, where ppm NO is parts per million nitric oxide. The accuracy of the instrument between 0 and 4000 ppm shall be at least ±4.0 % of point or 25 ppm NO, whichever is greater. The accuracy of the instrument between 4001 and 5000 ppm shall be ±5.0%. The calibration curve must comply with the quality control specifications in Section 6.04(4)(b) for calibration curve generation.

5. Oxygen Analysis (optional): If an oxygen analyzer is included, the analyzer shall cover at least the range of 0.0% O_2 to 25.0% O_2. The accuracy of the instrument over this range shall be at least 5% of point or ±0.1% O_2, whichever is greater. The calibration curve must comply with the quality control specifications in Section 6.04(4)(b) for calibration curve generation. Failure of the oxygen measuring system shall not cause the GAS to be locked out from

performing a certified emission test.

6. Repeatability: The repeatability for the HC analyzer in the range of 0-1400 ppm HC shall be 2% of point or 3 ppm HC absolute, whichever is greater. In the range of 1400-2000 ppm HC, the repeatability shall be 3% of point. The repeatability for the CO analyzer in the range of 0-7.00% CO shall be 2% of point or 0.02% CO absolute, whichever is greater. In the range of 7.00% to 10.00% CO, the repeatability shall be 3% of point. The repeatability for the CO_2 analyzer in the range of 0-10.0% CO_2 shall be 2% of point or 0.1% CO absolute, whichever is greater. In the range of 10.0% to 16.0% CO_2 , the repeatability shall be 3% of point. The repeatability of the NO analyzer shall be 3% of point or 20 ppm NO, whichever is greater. The repeatability of the O_2 analyzer shall be 3% of point or 0.1% O_2 , whichever is greater.

(d) Ambient Conditions: The current relative humidity, dry-bulb temperature, and barometric pressure shall be measured and recorded prior to the start of every inspection in order to calculate Kh (nitric oxide correction factor, see Section 6.01(2)(a)(v)).

1. Relative Humidity: The relative humidity measurement device shall cover the range from 5% to 95% Rh, and 35°F - 110°F, with a minimum accuracy of °5% Rh. Wet bulb thermometers shall not be used.

2. Dry-bulb Temperature: The dry-bulb temperature device shall cover the range from 35°F - 110°F with a minimum accuracy of ±3°F.

3. Barometric Pressure: The barometric pressure measurement device shall cover the range from 610 mm Hg - 810 mm Hg, and 35°F - 110°F, with a minimum accuracy of ±3% of point.

(4) Automated Test Process Software and Displays.

(a) Software: The testing process, data collection, and quality control features of the analyzer system shall be automated to the greatest degree possible. The software shall automatically select the emission standards and set the vehicle load based on a State-provided or approved look-up table. Vehicle identification information may be derived from a database accessed over a real-time data system to a host computer system. Entry of the VIN shall be sufficient to access the vehicle record. Provision shall be made for manual entry of data for vehicles not in the host computer system.

(b) Test and mode timers: The analyzer shall be capable of simultaneously determining the amount of time elapsed in a test, and in a mode within that test.

(c) Clocks and Timers: The clock used to check the coast-down time shall be accurate to within 0.1% of reading between 0.5 and 100 seconds, with a resolution of 0.001 seconds. The ASM test mode timers used shall be accurate to within 0.1% of reading between 10 and 1000 seconds with a resolution of 0.1 seconds.

(d) Display Refresh Rate: Dynamic information being displayed shall be refreshed at a minimum rate of twice per second.

(e) Minimum Analyzer Display Resolution: The analyzer electronics shall have sufficient resolution to achieve the following:

HC	1	ppm HC as hexane

NO	1	ppm NO
C	0.01	% CO
CO_2	0.1	% CO_2
O_2	0.1	% O_2
RPM	10	RPM
Speed	0.1	mph
Wheel Force	0.1	lb
Relative Humidity	1	% Rh
Dry Bulb Temperature1		°F
Barometric Pressure	1	mm HG

(f) Engine Speed Detection: The system shall be capable of detecting engine speed in revolutions per minute (rpm) with a 0.5 second response time and an accuracy of ±3% of the true rpm.

(g) Display during testing: The display during testing shall read "Test in Progress" and shall digitally display the vehicle's speed in mph. Emissions values shall not be displayed during official testing.

6.04 ASM Quality Control Requirements

(1) General Requirements

(a) Minimums: The frequency and standards for quality control specified here are minimum requirements, unless modified as specified in paragraph (2) of this section. Greater frequency or tighter standards may be used as needed.

(b) Statistical Process Control: Reducing the frequency of the quality control checks, modifying the procedure or specification, or eliminating the quality control checks altogether may be allowed if the Administrator determines, for the purpose of properly conducting an approved short test, that sufficient Statistical Process Control (SPC) data exist to make a determination, that the SPC data support such action, and that taking such action will not significantly reduce the quality of the emissions measurements. Should emission measurement performance or quality deteriorate as a result of allowing such actions, the approval shall be suspended and the frequencies, procedures specifications, or checks specified here or otherwise approved shall be reinstated, pending further determination by the Administrator.

(2) Dynamometer

(a) Coast down Check.

1. Coast Down Frequency: The calibration of each dynamometer shall be automatically checked every 72 hours, when the dynamometer is in active service, by a dynamometer coast-down procedure equivalent to Section 86.118-78 of the US EPA regulations (for reference see EPD test procedure TP-302A and TP-202) between the speeds of 30-20 mph. All rotating dynamometer components shall be included in the coast-down check. Speed windows smaller than ± 5 mph may be used provided they show the same calibration capabilities.

2. Coast Down HP Settings: The base dynamometer inertia (2000 pounds) shall be checked at two random horsepower settings for the speed range 30 to 20 mph. The two random horsepower settings shall be between 8.0 to 18.0 horsepower. Use of a

shunt resistor for a load cell performance check is not permissible because it does not verify the performance of the actual load cell, only the signal-processing portion of the system.

(i) If either the first or the second HP setting causes the dynamometer to fail the coast down audit, record the HP and other audit data in fields 50 through 54 of CAL.DAT.

(ii) If both randomly selected HP setting cause the dynamometer to pass the coast down audit, or both settings cause the dynamometer to fail the coast down audit, record the audit data associated with the second randomly selected HP setting in fields 50 through 54 of CAL.DAT

3. Coast Down Procedure: Each dynamometer's calibration shall be checked every 72 hours by means of an automated dynamometer coast-down check procedure approved by BAR. An integral motor, while recommended, is not required. The coast-down performance check shall be conducted between the speeds of 30-20 mph and 20-10 mph. All rotating dynamometer components shall be included in the coast-down check. If either the measured 30-20 mph coast-down time or the 20-10 coast-down time is outside the window bounded by Calculated Coast-down Time (CCDT)(seconds) ±7%, then it shall be locked out for official inspection purposes until recalibration indicates a passing value.

(i) Randomly select an IHP2525 value that is between 8.0 hp and 18.0 hp and set dynamometer PAU to this value. Coast-down dynamometer from 30-20 mph.

Where:

DIW = Dynamometer Inertia Weight. Total "inertia" weight of all rotating components in dynamometer.

V_{30} = Velocity in feet/sec at 30 mph.

V_{20} = Velocity in feet/sec at 20 mph.

$IHP2525_{yy}$ = Randomly selected ASM2525 indicated horsepower.

$PLHP_{25\text{-}yy}$ = Parasitic Horsepower for specific dynamometer at 25 mph.

4. Parasitic Value Calculations: If the coast-down values do not verify in Section 6.02(2)(k), parasitic losses shall be calculated using the following equations at 25 mph. The indicated horsepower shall be set to zero for these tests.

(i) Parasitic losses at 25 mph for a dynamometer with yy diameter rollers.

Where:

DIW = Dynamometer Inertia Weight. Total "inertia" weight of all rotating components in the dynamometer.

V_{30} = Velocity in feet/sec at 30 mph.

V_{20} = Velocity in feet/sec at 20 mph.

CDT = Coast-down time required for dynamometer to coast from 30 to 20 mph.

(b) Roll Speed: Roll speed shall be check in conjunction with the coast down check. A missing roll speed or roll count signal shall cause the coast down check to fail.

(3) Emission Sampling System

(a) Leak Check: The entire sample system shall be checked for vacuum leaks on a daily basis and for proper flow on a continuous basis. The sample system leak check shall be performed on all sample probes using the manufacturer's recommended procedure. The allowed maximum leak rate and minimum flow rate shall be those determined in the equipment certification procedure (see Appendix B).

(b) Dilution: The flow rate on the analyzer shall not cause dilution of the exhaust gas sample.

(4) Analytic Instruments

(a) General Requirements: The analyzer shall, to the extent possible, maintain accuracy between gas calibrations taking into account all errors, including noise, repeatability, drift, linearity, temperature, and barometric pressure.

(b) Two-Point gas Calibration.

1. Calibration Method: Analyzers shall automatically require a two-point gas calibration for HC, CO, CO_2, and NO. Gas calibration shall be accomplished by introducing span gases that meets the requirements of (d)(3)(iv) in this section into the calibration port. The pressure in the sample cell shall be the same with the calibration gas flowing as with the sample gas flowing during sampling. When a calibration is initiated, the analyzer channels shall be adjusted to the center of the allowable tolerance range.

2. Calibration Frequency: Analyzers shall be calibrated within 72 hours before each official test. The state may adjust the calibration check frequency as necessary based on a statistical process control algorithm approved by the Administrator. If the system does not calibrate or is not calibrated the analyzer shall lock out from testing until corrective action is taken.

3. Working Zero and Span gases: The following gases shall be used for the calibration check

(i) Zero gas

O_2	=	20.7%
HC	<	3 ppm THC as C-1
CO	<	3 ppm
CO_2	<	400 ppm
NO	<	1 ppm
N_2	=	Balance 99.99 % pure

(ii) Working span gas – ASM Analyzers

HC	=	3200 ppm propane
CO	=	8.0%
CO2	=	12.0%
NO	=	3000 ppm
N2	=	Balance 99.99% pure

(iii) Working span gas – TSI Analyzers

HC	=	3200 ppm propane
CO	=	8.0%
CO2	=	12.0%
N2	=	Balance 99.99% pure

(5) Traceability: The zero and span gases used for the gas calibration shall be supplied by a BAR certified blender and in accordance with BAR approved procedures. The zero and span gases shall be blended to an accuracy of ±1% of the specified values and have a blend tolerance of ±2%.

(a) Change of Calibration Gas: When a GAS bottle is changed the new bottle values will be entered into the station data.

(b) Low Range Calibration: The analyzer shall contain provisions for the installation of a second, low range gas cylinder, i.e., necessary plumbing and solenoid, along with the software needed to perform an audit using the low range gas at the same time as the 72-hour GAS calibration. The low range audit would compare the measured concentration, after calibration using the working span gas, to the cylinder value. If the measured value differs from the cylinder value by more than 3% of the cylinder value, the analyzer would be locked out and the operator notified of the reason for the lockout. The installation of the second cylinder was not required as part of the Phase I system or during Phase II. Installation of the low range cylinder and the implementation of the software to trigger the low range audit would be required for Phase III, or later if EPD determines, during Phase I, Phase II, and Phase III audits, that excessive analyzer calibration violations are occurring.

(c) Five-Point GAS Audit.

1. Audit Frequency: Analyzers shall successfully pass a five-point gas audit for HC, CO, NO, and CO_2. Analyzers shall undergo the audit procedure minimally every six months. The analyzer shall be adjusted or repaired if the requirements of Section 6.03(3)(b) are not met.

2. Audit Method: Gas calibration audit shall be accomplished by introducing span gas that meets the requirements of (d)(3)(iv) in this section. The pressure in the sample cell shall be the same with the calibration audit gas flowing as with the sample gas flowing during sampling.

3. Audit gases: The following gases shall be used for the calibration check. Other calibration gas values may be acceptable when a "gas blender" apparatus is used if approved by the Administrator. Oxygen-free nitrogen will be used as the balance gas.

Zero Gas	Bottle Value	Georgia Phase II
Total HC*	<0.1 ppm THC	0 ppm +/- 2 ppm
Carbon Monoxide	<0.5 ppm	0.00% +/- 0.01 %
Carbon Dioxide	<0.1 ppm	0.00% +/- 0.1 %
Nitric Oxide	<0.1 ppm	0 ppm +/- 10 ppm

* (Read as propane)
Note: Zero bottle tolerances assume auto-zero prior to readings and reflect noise.

Low Bottle	Bottle Value	Georgia Phase II
Propane	200 ppm	200 ppm +/- 12 ppm
Carbon Monoxide	0.5 %	0.5% +/- 0.03 %
Carbon Dioxide	6.0%	6.0% +/- 0.3 %
Nitric Oxide	300 ppm	300 ppm +/- 30 ppm

Low Middle Bottle	Bottle Value	Georgia Phase II
Propane	960 ppm	960 ppm +/- 48 ppm
Carbon Monoxide	2.40 %	2.40% +/- 0.12 %
Carbon Dioxide	3.6%	3.6% +/- 0.3 %
Nitric Oxide	900 ppm	900 ppm +/- 45 ppm

High Middle Bottle	Bottle Value	Georgia Phase II
Propane	1920 ppm	1920 ppm +/- 96 ppm
Carbon Monoxide	4.80 %	4.80% +/- 0.24 %
Carbon Dioxide	7.2%	7.2% +/- 0.4 %
Nitric Oxide	1800 ppm	1800 ppm +/- 90 ppm

High Bottle	Bottle Value	Georgia Phase II
Propane	3200 ppm	3200 ppm +/- 160 ppm
Carbon Monoxide	8.00%	8.00% +/- 0.40 %
Carbon Dioxide	12.0%	12.0% +/- 0.6 %
Nitric Oxide	3000 ppm	3000 ppm +/- 150 ppm

4. Traceability: The span gases used for the GAS calibration and the gas audit shall be traceable to National Institute of Standards and Technology (NIST) standards ±1%, and shall have a 5% blend tolerance.

5. Audit Specifications: The analytical system shall read the audit gas within 5% of labeled value. The analyzer shall be adjusted or repaired if the accuracy specifications are not met. The audit readings shall be obtained by introducing the audit gas through the analyzer probe. The gas shall be introduced in a manner that will not result in pressurizing the sample cell.

(d) Service and Repair Calibration

1. In-field Calibration: Each time an analyzer's emissions measurement bench or NO cell is repaired or replaced, a minimum of a five-point gas audit shall be performed by the management contractor. When a manufacturer field service representative replaces a bench or NO cell, the FSR shall notify the management contractor using established procedures. An audit of the analyzer will be performed promptly thereafter. It is expected that the FSR performing service should insure that the gas will pass a five-gas audit by the management contractor.

2. Serial numbers for the analyzer benches shall be recorded in the CAL.DAT record during each gas calibration routine automatically.

3. Leak Check: Each time the sample line integrity is broken; a leak check shall be performed prior to testing.

6.05 ASM Test Record Information

Test Data: In addition to the information required to uniquely identify the testing station, inspector, and vehicle, the following data shall also be recorded. The exact record description and format is contained in the software specification and is found in Appendix-C File Structure. The information to be collected is described in the test record (GAS.DAT) and calibration record (CAL.DAT). See Appendix C.

6.06 Reserved

6.07 Other ASM Hardware Requirements

(1) Restraint System: The test system shall include a vehicle restraint system. The system shall be capable of restraining vehicles under all reasonable operating conditions. It shall not impart significant vertical or horizontal force on the vehicle being tested. The system shall not restrict access to the vehicle’s doors for ingress and egress.

(2) Cooling Fan The system shall incorporate a cooling fan that can be used by the inspector when prompted by the GAS. The fan shall have a minimum capacity of 3000SCFM. The fan shall be placed within 12" of the front of the radiator to cool the vehicle but not placed to cool the catalytic converter.

6.08 Other Fuel Cap Test Hardware Requirements

(1) The system shall include an EPA-approved system for testing the integrity of the seal and pressure retention of the vehicle's fuel cap.

(a) Fuel Cap Tester specifications

1. The cap tester shall identify fuel caps that leak more than 60 cc/min at 30 inches of water pressure.

2. The flow standard shall be a square edged circular orifice sized to produce a leak rate of 60 cc/min of air at a pressure of 30 inches of water.

3. The supply pressure may be obtained using ambient air and any convenient low-pressure source. The cap tester shall control the supply pressure and prevent over-pressurization.

4. The cap tester shall provide a visual and/or digital signal that the air pressure is within the acceptable range and the flow comparison is ready to be conducted.

5. If the tester is battery powered, it must be equipped with an automatic shutoff and a low-battery indicator.

6. The system shall be tamper resistant.

7. A reference passing fuel cap or calibration tool of 52-56 cc/min and a reference failing cap or calibration tool of 64-68 cc/min shall be supplied for accuracy verification.

(b) Fuel cap adapters:

1. Adapters shall be supplied which will allow testing of at least 95% of the fuel caps that are used on 1975 and later U.S. model cars and light trucks.

2. Varying internal volumes of the fuel caps and adapter assemblies shall not affect the accuracy y of the test results.

3. Adapters shall be made available within two years of the introduction of new model year vehicles.

(c) An application guide indicating the proper fuel cap adapter to be used during the testing of a fuel cap shall be kept current.

(d) Operating range:

(1) The tester shall be accurate at all elevations.

(2) The tester shall be accurate within a temperature range of 41 degrees F to 110 degrees F ambient.

(e) Accuracy: Leak rate measurements shall be accurate within + 3%.

(a) Output: The device shall provide a visual and digital signal to indicate pass or fail status.

(f) The leak test shall not last more than 45 seconds.

(g) Quality Control: The flow tester accuracy shall be verified daily by testing the two reference caps or calibration tool and correctly identifying the passing and failing leak rates. Failure to pass this verification shall result in the GAS being locked out from official testing until repairs are made and the tester passes the verification.

(2) Fuel Cap Calibration

(a) The GAS shall test the passing cap first, then the failing cap during the fuel cap calibration routine. Pass/Fail calibration tools may be used in lieu of caps.

(b) At the conclusion of the cap tester verification, the results will be placed in the CAL.DAT file.

(c) Flow calibrations of the reference caps shall be performed before initial usage and thereafter as required, based on analysis of quality control data.

Section 7 - Documentation, Logistics and Warranty Requirements

7.01 General

The following items shall be included with each instrument submitted for certification or delivered to stations:

(1) Instruction manual, securely held in a binder (or other suitable container) made of a material that is resistant to most petroleum-based products used in the garage environment.

(2) An easily understood explanation of warranty provisions (including limitations and restrictions) and a listing of components covered and not covered, signed by a company representative and the purchaser, contained in the instruction manual.

(3) All special adjustment and calibration tools, to include all apparatus for gas calibration (internal/integral), and probe tip caps that are required for conducting all leak checks on the analyzer probes and the anti-dilution probes, will be provided by the GAS equipment manufacturer.

(4) Attached placard denoting operating procedures, gas checking/calibrating steps, maintenance items, and local service contact with phone number and address.

(5) The manufacturer shall supply upon delivery to the purchaser the following: four sets of filters, at least 2500 sheets of fan-fold paper or equivalent plain sheet paper, two extra printer ribbons or an extra toner cartridge, and one extra set of gas cylinders (if required for calibration). Manufacturers are not required to deliver spare parts to stations if the station operator agrees to accept a voucher, good for the full price of the spare parts, provided when the analyzer is purchased.

7.02 Instruction Manual

The instruction manual accompanying each analyzer shall contain the following minimum information:

(1) Background information describing how emissions are formed during the combustion process, the general types of controls that are used on vehicles and what negative health impacts can result from vehicle emissions;

(2) Functional diagrams (inspectoral and electrical);

(3) Accessories and options (included and/or available);

(4) Model number and identification markings and locations;

(5) Maintenance procedures and frequencies recommended by the manufacturer. The services that should be performed only by the manufacturer shall be clearly identified;

(6) Gas calibration/leak check procedures;

(7) Brief description of the inspection/test procedures with a subject index;

(8) Brief description of emission analyzer operating principles;

(9) A listing and easily understood explanation of warranty provisions (including the extended warranty), signed by a company representative and the purchaser, contained in the instruction manual. Information provided shall include a listing of warranty repair stations by name, address and phone number; and

(10) Name, address and phone number of the manufacturer's representative in charge of sales and service personnel for the company in Georgia. In addition, information shall be provided indicating the name, address and phone number for the company's Vice President of service (or equivalent) who reports directly to the Chief Executive Officer. The names of these representatives shall be verified, or updated as needed, every time a service technician visits a station.

7.03 Instrument Warranty

The cost of the analyzer shall include a three-year transferable warranty covering parts and labor. This warranty may consist of one year of a mandatory warranty, plus two optional years of warranty coverage purchased at the option of the instrument purchaser. Warranty of the emissions analyzer shall commence not earlier than the date the emission analyzer receives the first “Final Inspection” from GCAF. Warranty of the dynamometer GAS analyzer components shall commence not earlier than the date production software is installed.

The warranty shall cover all items that are located inside the secured area(s) of the analyzer. The manufacturer shall provide instructions to the purchaser describing the procedures needed to repair, replace, or adjust components that are not covered by the warranty and can be accessed without compromising the security of the analyzer. The manufacturer shall provide the purchaser with the information necessary to properly select replacement parts not covered by the warranty to prevent degradation of analyzer performance. The manufacturer shall supply a list of acceptable replacement parts for user replaceable parts. This shall include, at a minimum, the monitor, the printer, keyboard and any other parts determined by the manufacturer.

An adequate number of qualified repair technicians shall be retained by the manufacturer to perform repairs on analyzers.

Preventive maintenance is not required by the State. However, if the manufacturer feels that preventive maintenance is required or feels that it will reduce the warranty costs, it shall be included in the price of the analyzer. The terms and conditions of the warranty shall not be contingent on the purchase of any additional warranties or entering into a service agreement or maintenance agreement. Any preventive maintenance options shall be identified to prospective purchasers in order for them to understand the prospective costs.

Warranty Provisions

Warranty provisions protecting the interest of the buyer shall include:

(1) Location, phone number and address of the repair centers throughout the state. The repair technicians shall be of an adequate number and located to efficiently and timely meet service needs. The response time established by the manufacturer may be long for

a lower analyzer purchase price or short if the analyzer price is higher. All response time and cost provisions shall be clearly indicated in the warranty provisions. The maximum response time shall be two (2) business days (Monday - Friday) from the time of call. Shorter response times may be provided as an option

(2) Name of the manufacturer's representative

(3) Coverage of at least all of the I/M hardware and software contained inside the tamper resistant cabinet. A description of specific parts and labor covered by the provisions of the warranty shall be permanently provided to the purchaser- In addition, the warranty shall itemize the parts and labor which are not covered by the warranty.

To ensure that purchasers are properly notified regarding the cost and provisions of the warranty, the GAS shall not be delivered until a copy of the warranty has been signed by the purchaser and a company representative. Service response time and loaner provisions shall be initialed by the purchaser. A copy of the signed warranty shall be provided to the purchaser, a copy forwarded to the State and a copy filed by the company.

(4) The analyzer owner shall be provided a cost estimate prior to the performance of any service or maintenance unless the work will be covered by the warranty. Regardless of whether or not the work is covered by the warranty, the owner shall be provided a detailed description of the work performed when the job is completed. In addition, the description of the work performed, the owner shall include a toll free telephone number for the owner of the analyzer to call if he/she wants to complain about the work performed the courtesy or competency of the manufacturer's technician, or any other aspect of the warranty.

(5) Manufacturers shall provide stations with loaner instruments if they are unable to repair analyzers within the specified time indicated in the warranty. Loaner instruments shall be gas-calibrated, provided with new filters, printers shall be full of paper and shall contain the latest version of I/M testing software. The manufacturer's technician shall set up the loaned GAS, install all necessary access codes, a fresh floppy disk and any other tasks necessary to allow the station to immediately begin work. The manufacturer's technician shall mail any floppy disks removed because of repairs, to the management contractor. The technician shall transfer the station copies of certificates stored in the analyzer cabinet to the loaner. Care shall be taken by the technician to maintain the sequence of the certificates.

Loaner Unit Procedure

In lieu of the loaner requirement, EPD must review and approve a "written alternative loaner unit procedure" submitted by the GAS manufacturer that provides sufficient protection to maintain the integrity of electronic transmission. This alternative procedure should clearly illustrate the methods used to initialize and establish the personality of the "loaner unit". The procedure should be capable of automatically retrieving personality information of the "old unit" from its hard drive or floppy drive, whichever is operational, and transfer that information to the "loaner unit" without manufacturer service technicians performing manual key entry.

The GAS shall contain a loaner unit procedure, to be available to manufacturer field service personnel, which will perform the following functions:

(1) The following data shall be deleted from the hard disk of unit being replaced:

GAS.DAT
GAS.HST
CAL.DAT
TAMPER DAT
VIDCOMM.DAT
INVENTRY.DAT
TOKEN.REC
STATION.DAT
TECH.DAT
CERTNUM.DAT

(2) The loaner unit shall use the floppy disk of the unit being replaced.

(3) The following data shall be copied from floppy to the new hard disk (which will be a clean disk):

GAS.DAT
CAL.DAT
TAMPER.DAT
VIDCOMM.DAT
INVENTRY.DAT
TOKEN.REC
TECH.DAT
CERTNUM.DAT

(4) Manufacturer specific data such as station name, address, etc. and unit configuration data such as OBD scanner type, etc. may be copied from floppy to the hard disk of the loaner unit.

(5) All software updates ordered by the State as part of the Phase II upgrade.

7.04 Spare Parts

The instrument manufacturer shall maintain an adequate supply of spare parts and accessories to fulfill the service requirements of the instrument warranty/extended warranty.

7.05 Service Centers

The analyzer manufacturer shall provide or contract for warranty repairs within the Atlanta area.

7.06 Workmanship

Each manufacturer or his agent shall guarantee the repairs made for a period of 90 days.

7.07 Parts Removed

(1) All parts removed from an instrument to accomplish repairs will be accounted for and given to the instrument owner when the instrument is returned to service except for parts

covered under warranty.

(2) Parts that can be rebuilt and returned to service shall be listed on the completed work order.

7.08 Noncompliance with Any Portion of the GAS Specifications

(1) The initial certification of the test system expired on July 1, 1997. The certification will be extended upon approval of the Phase III software and hardware upgrade package.

(2) The manufacturer's GAS certification will not be renewed, or may be conditionally revoked if the State determines that an analyzer does not fully comply with all portions of the analyzer specifications and/or any of the following conditions exist:

(a) Software updates are not performed within the time frame specified by the State or do not meet the requirements specified by the State;

(b) Analyzers in the field are found to be in violation of the GAS specifications and the manufacturer is unwilling to resolve the matter in the time frame requested either by the State or in a way that is satisfactory to the State. Revocation of the manufacturer's certificate may be limited to future sales of analyzers. However, existing analyzers, which do not conform to analyzer and update specifications, will be locked out until they are brought into compliance. If problems identified are not corrected within the time specified by the State, certification may be permanently revoked. If a certificate is conditionally or permanently revoked, the State will notify all licensed stations and representatives of the repair industry that we will no longer license new stations purchasing affected analyzers.

Section 8 - Other Program Requirements

8.01 Station Licensing Requirements

All inspection stations shall complete an application in the format provided by EPD and the management contractor. In addition to the basic requirements contained in the program regulations, all stations shall comply with the additional specifications below. Each station shall receive an inspection by the management contractor. The station shall demonstrate that it meets all requirements of the EPD regulations and this manual before a Certificate of Authorization will be issued.

(1) Waiting Area: For stations performing ASM tests, or which require the motorist to exit the vehicle in order to perform the inspection, a waiting area shall be provided. The waiting area shall allow motorists to observe the inspection. The emission inspection station may use a video camera monitoring system to provide viewing by the motorist. This system shall permit live monitoring of emission inspections. The viewing monitor shall be large enough to allow the consumer to witness the entire emission inspection. The capturing system shall be positioned to allow the consumer to view the entire test lane and GAS unit.

(2) Data Transmission Line: Each inspection station shall provide a dedicated business telephone line for each GAS unit at the facility. The data transmission line shall be maintained to provide connection to the vehicle inspection database at all times.

(3) Program Sign: Each station shall acquire a station identification sign that contains the following information: the program logo, the heading "State Approved Emission Inspection Station", station operating hours and days, an indication that it is a full-time or appointment only station. EPD will establish specific requirements for construction and design of the sign. In order to ensure consistency of signs, station operators must acquire their signs from a list of suppliers approved by EPD. EPD will approve any supplier who submits a sample sign that meets EPD requirements and who agrees to supply identical signs to station operators.

(4) Video Camera Monitoring: Because fleet stations cannot be subjected to covert vehicle audits in the same manner as public stations, fleet, dealer and mobile test systems may be required to install a video camera system. Stations may be required to install a video system if they are found to have test failure rates which are significantly higher or lower than other stations, considering the age and type of vehicles tested and other factors affecting failure rates, or if other types of data analysis by EPD or the management contractor indicate a significant likelihood of improper testing. The system shall be installed for a period of 90 days. If review of the video records shows that inspections are not being performed correctly, the video records may be used in any enforcement action taken against the station.

(a) The video system shall be approved by EPD. The system shall capture the image of the rear of the vehicle being inspected at a distance that allows an adequate view of the inspection process and the vehicle license plate. The video record shall include

an accurate day and date indication, or may be required to superimpose test information on the video record.

(b) The system shall be operated at all times when vehicles are being tested. Videotapes shall be maintained by the station for 60 days. Tapes shall be available for inspection during normal business hours.

(5) Test Systems: All stations shall, prior to the commencement of official testing, have installed a test system that has been approved by EPD as meeting all applicable standards. Because test systems will be undergoing certification at the same time as station licensing is occurring, stations may apply for a Certificate of Authorization prior to approval of test systems. Stations shall list on their application the proposed test system and manufacturer. Stations, which meet all other requirements, may be granted a provisional Certificate, if the test system is undergoing certification by EPD, pending approval of the test system. Provisional Certificates will not allow automatically stations to perform official tests. The director may allow stations with provisional certificates to perform tests temporarily at his discretion, but no official testing may be performed after January 1, 1996, without a fully approved test system.

Station operators shall at all times maintain their test systems as required by the manufacturer, including routine maintenance such as filter replacements on the schedule established by the manufacturer. All test system part(s) that are replaced by the station shall meet or exceed manufacturer's original equipment specification.

(6) Mobile Test Systems: EPD will permit the licensing of mobile test systems for the purpose of testing fleet and car dealer vehicles at locations that are not licensed as fleet stations. Mobile test systems must meet the same requirements as regular test stations with the following exceptions:

(a)The test system does not have to be connected to the VID at all times in order to perform tests. Offline testing is permitted, up to the number of tests allowed through the VID. Mobile test station owners may apply for a limit up to 250 maximum. The station owner must have a dedicated phone line for the mobile test system. Mobile test systems are required to reconnect to the dedicated phone line and the collected test and other data transmitted no more than 72 hours after any test that is performed.

(b)Mobile test systems must submit a schedule of locations where testing will be performed on at least a monthly basis. EPD recommends a weekly schedule. All changes shall be submitted to the management contractor at least 24 hours prior to testing.

(c)Mobile test systems are not permitted to test vehicles except those owned or operated by the fleet or dealer location where the testing is performed. Mobile test systems are not allowed to set up locations to test vehicles for the public. However, station owners may obtain a certificate allowing the test system from a regular test station to perform mobile testing of fleet and dealer vehicles during off hours, provided that the regular test station is operated at all times during its posted hours.

(7) Calibration gases: Station operators shall utilize only calibration gases that meet the specified accuracy tolerances. EPD may establish specific procedures for ensuring that gases meet the accuracy tolerances, and may require that calibration gases be obtained only from suppliers that have demonstrated through those procedures that their gases comply with the accuracy requirements.

(8) Prior History: The Director may deny a Certificate of Authorization to owners who have been found to commit serious violations of I/M testing regulations or to engage in serious violations of civil or criminal law.

8.02 Inspector Requirements

(1) Inspectors must complete the EPD-approved training course and pass a written and hands-on test prior to being issued a certificate to perform I/M inspections and an inspector identification badge. The training course will be provided by the management contractor and will include the topics listed in the regulation. Inspectors shall obtain training on the use of the model of test system that they will use from the equipment supplier. Upon completion of the training course and passing the written test, the inspector will be required to perform practice inspections to demonstrate that he or she is able to perform all aspects of the inspection process correctly. Candidate inspectors who complete all portions of this process correctly will be issued an inspector certificate. However, certificates may be denied based on a past history of serious violation of I/M program regulations or of serious violations of civil or criminal law.

(2) Inspectors are required to perform their duties in a professional and courteous manner at all times. Inspectors who fail to conduct themselves in a professional manner, or who are rude or discourteous to motorists may be deemed in violation of these rules and subject to enforcement action, including suspension or revocation of the inspector's license.

(3) Inspectors shall display their inspector certificates in a prominent location in the inspection area.

8.03 Test Sequences

(1) The inspection test sequence is designed to be as automated as possible. Inspectors shall conduct inspections in the sequence prompted by the test systems. One of the primary goals of the enhanced I/M program is to minimize the manual entry of vehicle and test data by inspectors. This will both reduce data entry errors and reduce the amount of time needed to perform the inspection. Therefore, whenever access to the Vehicle Inspection Database (VID) is available through the data transmission line, manual data entry should be limited to only those fields needed to access and search the VID. Manual entry of complete vehicle information is permitted only if the VID is not available or the vehicle to be inspected is not found in the VID.

(2) Prior to the commencement of an inspection, the motorist shall be instructed to turn off all switchable accessories, or the inspector may turn them off.

(3) In addition to the general requirements for conducting the test contained in Sections 3.10 through 3.35 of Georgia Department of Natural Resources Enhanced Inspection and Maintenance Test Equipment and Specifications-Phase III, the following criteria must also be met when conducting inspections.

(4) Tests can be aborted by the inspector and the vehicle fails if the vehicle experiences a mechanical or safety problem once the test has begun. The vehicle should be checked prior to the beginning of the inspection and the vehicle rejected prior to beginning entry of

vehicle data if there is an obvious mechanical or safety problem. Once the test has begun, the inspector may abort the test, and enter the appropriate code, if a problem then occurs. (See codes 01, 02, 03, 04, 08, and 09). If during the test, a vehicle has an RPM reading outside the allowed range or does not meet the minimum CO + CO_2 level, the test will be stopped and the inspector will have the option of restarting the test or aborting the test. If the test is aborted by the inspector (the inspector enters code 96, 97 or 98), the test will end and will not be considered an official test. The inspector may restart the test three times. If on the third restart the vehicle still does not meet the RPM or CO+CO_2 limits, the test will automatically be ended and the test result recorded by the GAS unit as an abort-fail (code 05, 06 or 07, as appropriate). EPD recommends that tests be aborted (and no fee charged) prior to obtaining the automatic abort-fail (which requires that a test fee be paid) for vehicles that have problems meeting the RPM or dilution limits. Because the meeting the high RPM (2500 RPM) limit is within the control of the inspector, inspectors should never allow vehicles to fail for this reason, i.e., tests should be aborted if the inspector cannot keep the vehicle within the 2500±300 RPM window.

The inspector may end the test by entering any of the abort codes beginning with an "8" or a "9". In addition to the three listed above for RPM or dilution problems, these include: 90 if the inspector decides not to test BMW, Peugeot or Volvo vehicles that may have transmission problems if tested; 91 if the inspector does not have the required license, i.e.: inspectors who do not have a license to perform ASM tests will not be allowed to test older vehicles which are subject to this test; 92 if it determined that an inspection is not required for that vehicle; 93 if the inspector is unable to obtain an RPM reading for the vehicle; and 94 if the motorist does not present completed repair form for any after-repairs test. If the test is aborted for any other reason, the inspector shall enter code 99 and the reason written on the vehicle inspection report. Inspections may also be aborted automatically by the GAS unit if a low flow condition is encountered during the test (code 95), or if there is an equipment malfunction. If the equipment causes an abort during the test the GAS shall print FREE on the VIR, the motorist is not to be charged for automatic aborts.

8.04 Records and Record Keeping

(1) The station operator is responsible for collecting and maintaining all records required in the regulations or this manual. The Director may require that any such additional records as he determines are necessary for adequate oversight of the program be collected and maintained by each station operator. Records shall be maintained for at least one year except as otherwise noted. Except as specifically provided for in the regulation or this manual, all required records will be kept at the inspection station and shall be made available to EPD or the management contractor during all station operating hours.

(2) In addition to any records required elsewhere, each station shall maintain:

- Any maintenance or calibration log supplied by EPD or the management contractor
- Original repair data forms for all vehicles receiving an after repairs tests. These forms will be collected by auditors during routine program audits.
- A copy of the most current repair facility data summary, as a guide for failing customers seeking information on vehicle repair facilities.

8.05 Emission Standards

(1) For two-speed idle inspections, the following emission standards will be utilized for all tests. The standards apply to all vehicles of each model year listed regardless of whether the vehicle tested is a car or truck. The same standards will be used for both the 2500-RPM and idle portions of the test.

MODEL YEARS	HYDROCARBONS - PPM Hexane	CARBON MONOXIDE - %
1984 and newer	220 ppm	1.2%
1981 - 1983	250 ppm	1.5%
1980	350 ppm	3.5%
1978 - 1979	500 ppm	5.0%
1977 and Earlier	600 ppm	6.0%

(2) For ASM inspections, the emission standards are described below and in Appendix O of this document.

(a) ASM Emissions Standards

1. ASM2525/5015 Standards. Start-up standards shall be used through the effective date of the final standards. The exhaust emissions standards for the following model years are cross-referenced by the number in the column in (a)(3) below of the ASM2525/5015 tables. The ASM2 emission tables are found in Appendix O once the test weight is known and the row number is located below.

(i) Light Duty Vehicles.

Model Years	Hydrocarbons	Carbon Monoxide	Oxides of Nitrogen
1996+ Tier 1	2	15	29
1991-1995	3	16	30
1983-1990	5	17	31
1981-1982	5	20	31
1980	5	20	36
1977-1979	12	24	36
1975-1976	12	24	38

(ii) Light Duty Trucks 1 (less than 6000 pounds GVWR).

Model Years	Hydrocarbons	Carbon Monoxide	Oxides of Nitrogen
1996+ Tier 1			
(<3750 LVW)	2	15	29
(>3750 LVW)	3	16	30
1991-1995	6	20	31
1988-1990	8	23	32
1984-1987	8	23	37
1979-1983	12	25	37
1975-1978	13	26	38

(iii) Light Duty Trucks 2 (greater than 6000 pounds GVWR).

Model Years	Hydrocarbons	Carbon Monoxide	Oxides of Nitrogen
1996+ Tier 1			
(<5750 LVW)	3	16	30
(>5750 LVW)	6	20	33
1991-1995	6	20	34
1988-1990	8	23	35
1984-1987	8	23	37
1979-1983	12	25	37
1975-1978	13	26	38

(b) ASM2525/5015 Final Standards. Subject to confirmation of the stringency of these final standards by the U.S. Environmental Protection Agency and establishment of an effective date by EPD, the following exhaust emissions standards shall be used. The exhaust emissions standards for the following model years are cross-referenced by the number in the column in (a)(3) below. The ASM2 emission tables are found in Appendix O once the test weight is known and the row number is located below.

(i) Light Duty Vehicles

Model Years	Hydrocarbons	Carbon Monoxide	Oxides of Nitrogen
1996+ Tier 1	2	15	29
1983-1995	2	15	29
1981-1982	2	17	29
1980	2	17	33
1977-1979	7	21	33
1975-1976	7	21	36

(ii) Light Duty Trucks 1 (less than 6000 pounds GVWR).

Model Years	Hydrocarbons	Carbon Monoxide	Oxides of Nitrogen
1996+ Tier 1	2	15	29
1988-1995	4	18	30
1984-1987	4	18	34
1979-1983	9	22	34
1975-1978	10	23	36

(iii) Light Duty Trucks 2 (greater than 6000 pounds GVWR).

Model Years	Hydrocarbons	Carbon Monoxide	Oxides of Nitrogen
1996+ Tier 1	2	15	29
1988-1995	4	18	32
1984-1987	4	18	34
1979-1983	9	22	34
1975-1978	10	23	36

(3) Emissions Table

The ASM2 emission tables are found in Appendix O. These tables contain the actual emission values used to evaluate the tailpipe test. The values in Table (a)-are parts per million for HC (columns 2-14), percent for CO (columns 15-28), and ppm for NO (columns 29-39). Column 1 contains vehicle test weights.

NOTE: The DATA in this chart is the same as the Federal ASM2 PDF formatted documents and will be supplied as a convenience to those reading this document.

Appendix A - Microcomputer Specifications

See 1.07, Microcomputer Specifications, in text for most of these specifications.

EXPANSION: The State is interested in insuring that the GAS will have expansion capability to add functions beyond those defined in this specification. For example, the GAS unit may need to be updated to provide for additional support for diagnostic and repair capability that might include on-line maintenance manuals using new technology such as CD-ROM or OPTICAL DISK storage devices.

DOCUMENTATION (TO BE PROVIDED ONLY TO THE STATE)

HARDWARE: For the microcomputer portion of each GAS system delivered, the vendor must provide complete technical/operational manuals covering installation and operation.

SOFTWARE: All prepackaged applications software deliveries (including but not limited to Operating Systems and BASIC if offered) must include manuals that fully explain all installation and operating procedures.

All such software deliveries must include a warranty, a licensing agreement, and (except for operating systems) a means for registration that provides for future updates.

All software deliveries must include the version or release number.

MANUALS: All manuals must be commercially printed and show title, manufacturer's name, address, and copyright date.

FILES: All files utilized must include a full record layout. This layout must identify file name, security, and each field. For each field the delimiters, contents, definition, and editing rules are to be provided in the form of a data dictionary.

Appendix B - Certification Procedures

EPD will require that all test systems meet the requirements contained in the version of the California BAR 97 procedures dated January 2, 1997. Certain procedures related to features in BAR 97 that are not in the Georgia specification, e.g., vehicle weight scale, may be ignored. EPD expects that hardware certification will be based almost entirely on certification of the analyzer, dynamometer and other equipment by BAR. Certification of the analyzer and test application software will be performed by EPD's management contractor. If a manufacturer intends to supply equipment for the Georgia program that will not undergo BAR certification, the manufacturer may propose alternative hardware certification procedures which will allow a demonstration that the system meets all Georgia specifications, but without the need to perform each acceptance testing procedure required by California on the Georgia unit. One example is the requirement for testing at temperatures at the extremes of the required range. A manufacturer may propose to substitute extreme temperature testing from a similar BAR-approved unit to satisfy this requirement for Georgia. Manufacturers are also allowed to propose using manufacturer-performed testing where feasible.

Any proposal to use alternative certification procedures must be approved by EPD, in consultation with its management contractor, prior to seeking certification. EPD will expect all relevant BAR certification requirements to be met and documentation supplied to the State whenever a Georgia unit is nominally the same as a BAR-certified unit. The acceptance of any alternative certification procedures by the State will not relieve the manufacturer of the requirement to meet all Georgia specifications.

(1) Leak Rate Acceptance Criteria: A needle valve teed into the line upstream of the sample pump inlet shall be used to induce a leak that reduces the readings by 3%. The unit under test shall fail the leak check and prevent further testing until corrective action is performed.

The analyzer shall not allow a deviation of more than 3% of readings obtained using the low-middle-range span GAS described in the table in Section 6.04, ASM Quality control Requirements.

(2) Ambient Conditions Instruments Acceptance Criteria: Upon installation and every six months, the performance of the ambient conditions weather instruments shall be crosschecked against a master weather station.

Acceptance Criteria: The individual instruments shall be within the tolerance specified in Section 6.03(3)(d).

(3) Installation of Revised Software - The Phase III software or any other revised test software must be approved prior to installation of the software on any GAS unit operating in a licensed test station. In most cases, upon verification of software by the management contractor, the manufacturer will be authorized to install the software in a limited number of beta sites for further evaluation. Upon successful demonstration of the operation of the revised software, EPD will authorize its installation on all Georgia certified units. Revised software may not be installed in operating units unless specifically authorized by EPD. Under no circumstances is software to be installed prior to beta testing without the express, written authorization of EPD. The following procedures are to be used.

(4) Software Modifications and Software Update Certification: Beyond the Phase III update,

periodic software updates may be necessary. EPD or the manufacturer may require them. In either case, the manufacturer is responsible for installing the software in its GAS units. The cost of any software update, except for the Phase III update, is the responsibility of the unit owner if the software update is required by the EPD, and is the responsibility of the manufacturer if they require the update.

(5) Updates to the software specifications will be provided to the manufacturers by EPD. The software version number is to be indicated on the GAS status screen, on each vehicle test record, each calibration record, and the VIR. The version number shall consist of a four digit numeric code to be made up of the last two digits of the year, followed by a two-digit version number.

(a) All software updates shall cause the software version number to change. There will be a separate field in the test record and calibration record indicating the software version currently in use. This will permit the EPD to search the VID to determine how many units have been updated by looking at the version number field.

(b) Areas in the software where changes or additions might be required include: preconditioning procedures and emission test sequences (as applicable for OBD, ASM2 and two-speed idle tests), various lookup tables, functional inspections, diagnostic and repair procedures, data communication procedures, criteria affecting emission standards selection, vehicle exemptions, capability to read on-board diagnostics fault codes and vehicle pass/fail criteria. Other areas not specifically mentioned may also be impacted at some point, but we do not expect to request changes in all these areas at once.

(c) To maintain the integrity of Georgia's I/M program, QA personnel will be instructed to lock out GAS units that have unauthorized modifications or are running unapproved software versions. The following criteria apply to software and software updates:

1. Only EPD-approved software shall be used in GAS units on the secured drive.
2. All proposed software updates must be thoroughly tested by the manufacturer before being submitted to the EPD. Update disks as well as electronically transmitted updates shall be encrypted in a manner approved by EPD. The GAS shall be capable of accepting software updates via floppy disk, CD ROM, or via modem.
3. All proposed software updates generated by the manufacturer shall be submitted to EPD with a written description of the reason for the update, such as the problem that the update corrects.
4. All proposed software updates, including manufacturer-generated updates, must be submitted to EPD for testing and approval as follows:

    (i) Software updates must be submitted on a mutually agreed upon medium.

    (ii) Each new software version submitted to the EPD, including minor revisions, must have a new and unique software version number.

    (iii) All proposed software updates must be accompanied by a cover letter with the following information:

    (iv) A description of all of the changes contained in the proposed software update, including manufacturer-initiated modifications.

    (v) A timeline of when the update is expected to be installed (start to finish)

and how many units will be updated.

(vi) If any hardware modifications or special procedures are needed to perform the software update, describe the procedures for performing the update.

(vii) All proposed software updates for the unit may require an accompanying data disk containing test records for OBD, ASM, and Two-Speed Idle tests, in a form determined by EPD or its contractor.

(I) The data disks may also be required to contain complete calibration records - three-day, dynamometer, and fuel cap tester calibration records.

(II) Depending on the type and number of changes contained in the proposed software update, EPD may require testing at EPD-approved beta sites prior to release of the software. EPD will perform a preliminary review of the proposed software prior to releasing it for beta site testing.

Appendix C - File Structures, Analyzer Software Update

<Excel files here>

Analyzer Software Update

The Phase III specification includes file layout changes for CAL.DAT, GAS.DAT, PROGRAM.DAT, VRT.DAT, and other files. Therefore, prior to performing the Phase III software/hardware upgrade, equipment manufacturers must ensure that all records in CAL.DAT and GAS.DAT have been successfully transmitted to the VID. The associated "HST" files should be deleted as part of the conversion process.

In order to ensure data integrity after the conversion it is recommended that a hardcopy of the inspector file and certificate inventory be produced before the conversion.

When the conversion is complete, a data refresh should be performed and a hardcopy of the inspector file and certificate inventory be produced for verification.

Appendix D - Communications Protocol

Proprietary Information

Appendix E - License Plates Issuing States and Abbreviations

AA	Armed Forces - Americas
AE	Armed Forces - Europe, Middle East, and Canada
AK	Alaska
AL	Alabama
AP	Armed Forces – Pacific
AK	Arkansas
AS	American Samoa
AZ	Arizona
CA	California
CN	Canada
CO	Colorado
CT	Connecticut
DC	District of Columbia
DE	Delaware
FL	Florida
FM	Federated States of Micronesia
GA	Georgia
GU	Guam
HI	Hawaii
IA	Iowa
ID	Idaho
IL	Illinois
IN	Indiana
KS	Kansas
KY	Kentucky
LA	Louisiana
MA	Massachusetts
MD	Maryland
ME	Maine
MH	Marshall Islands
MI	Michigan
MN	Minnesota
MO	Missouri
MP	Northern Mariana Islands
MS	Mississippi
MT	Montana
MX	Mexico
NC	North Carolina
ND	North Dakota
NE	Nebraska
NH	New Hampshire
NJ	New Jersey
NM	New Mexico
NV	Nevada
NY	New York
OH	Ohio
OK	Oklahoma
OR	Oregon

PA	Pennsylvania
PR	Puerto Rico
PW	Palau
RI	Rhode Island
SC	South Carolina
SD	South Dakota
TN	Tennessee
TX	Texas
US	United States Government
UT	Utah
VA	Virginia
VI	Virgin Islands
VT	Vermont
WA	Washington
WI	Wisconsin
WV	West Virginia
WY	Wyoming
XX	All Other Locations

Appendix F - OBD Test Sequence

The GAS must be equipped with a standard SAE J1978 OBD connector and communications link to allow an RPM signal, readiness monitors, fault codes, Malfunction Indicator Light (MIL) Command Status, PID, PCM ID, and OBD VIN (where available) numbers to be downloaded from the on-board computer for applicable vehicles.
The equipment design and operation must meet all Federal requirements (contained in 40 CFR 85.2207-2231) and recommended SAE practices (J1962, J1978 and J 1979) for OBD system inspections.
The OBD interrogation process shall be fully integrated into the GAS. It must be automated and require no inspector intervention to collect and record OBD data retrieved via the OBD diagnostic link. An RPM signal, OBD readiness monitors, failure codes, MIL status, and PID, PCM ID, and OBD VIN (where available) numbers shall be automatically retrieved through a standard interface and vehicle connector. No hand-held programmable unit or stand-alone interface may be used.

(1) OBD HOOKUP

(a) The program shall **"F"** fill the following fields as soon as the OBD testing sequence is started:

- MIL BULB KOEO,
- DLC TEST RESULT,
- OBD READINESS RESULT,
- MIL COMMAND STATUS, and
- OVERALL OBD RESULT

(b) The program shall blank fill all of the OBD READINESS MONITOR fields, the DTC STORED field, and all of the DTC FAULT CODE fields in the GAS.DAT record. The GAS shall store an "O" in field 44 of the GAS.DAT file to indicate an OBD test was started.

Programming Criteria:

1. The GAS shall prompt for an OBD diagnostic link connection for all MY 1996 and newer passenger vehicles and light-duty trucks. The GAS shall prompt the inspector to turn the ignition key to the off position and connect the OBD lead to the DLC.

Display Prompt:

TURN THE IGNITION KEY OFF.
LOCATE THE VEHICLE'S OBD DIAGNOSTIC LINK CONNECTOR (DLC).
ATTACH THE ANALYZER OBD LEAD TO THE VEHICLE CONNECTOR.
LEAVE THE KEY OFF FOR A MINIMUM OF 12 SECONDS BEFORE CONTINUING.
PRESS <F Key> IF CONNECTION IS NOT POSSIBLE
PRESS ENTER TO CONTINUE.

[Display OBD (10)]

NOTE: This screen is designed to allow the OBD computer time to power-down while following the instructions above.

The GAS shall be designed to provide assistance to the I/M inspector with OBD connector locations using an EPD approved OBD connector look-up table when supplied by EPD. Additionally, the equipment manufacturers shall provide help as part

of the documentation supplied with the update or with new equipment. This documentation should, at a minimum, allow easy look-up of MY, Make, and Model. The information should indicate the approximate location using the standard locator grid as shown in Appendix L of this document. The information should indicate if the DLC is covered.

2. If the inspector presses "ENTER" to indicate the key is off and the OBD lead is connected, the program shall proceed to the MIL BULB CHECK (KOEO) section.

3. If the I/M inspector presses <F Key> indicating a missing, damaged, tampered, obstructed, or inaccessible connector a message box shall be displayed as follows:

Display Prompt:

SELECT THE REASON THAT CAUSES THE DIAGNOSTIC LINK CONNECTOR (DLC) NOT TO BE CONNECTED.

1 **THE DLC CANNOT BE LOCATED BY THE I/M INSPECTOR.** {*Unpaid/ Abort}

2 **THE DLC IS DAMAGED OR TAMPERED AND CONNECTION IS NOT POSSIBLE.** {*Paid/ Fail}

3 **THE DLC IS OBSTRUCTED OR INACCESSIBLE AND CONNECTION IS NOT POSSIBLE.** {*Paid/ Fail}

4 **RETURN TO PREVIOUS SCREEN**. {**DEFAULT}

[Display OBD (11)]

NOTE: *Selections 1 through 3 shall indicate to the inspector the result of the selection and the FEE status ie: Unpaid/Abort, Paid/Fail
**Screen prompt shall default to selection #4, RETURN TO PREVIOUS SCREEN.

(i) If reason 1 is selected a "C" (Can't locate connector) will be written to the DLC TEST RESULT field in GAS.DAT. The GAS program shall return to display prompt [3.25(1)] if the OBD OR TSI OPTION field (13) of the PROGRAM.DAT file is "Y", if this field is "N" the GAS shall proceed to the OBD TEST EVALUATION Section. Display the abort screen to allow the inspector to abort the test as if the ESC key was pressed. If the inspector does not want to abort the test, the program shall start the test at the TSI Option screen [Display 3.25(1)].

(II) If reason 2 is selected a "D" (Damaged) will be written to the DLC TEST RESULT field in GAS.DAT. The GAS program shall return to display prompt [3.25(1)] if the OBD OR TSI OPTION field (13) of the PROGRAM.DAT file is "Y", if this field is "N" the GAS shall proceed to the OBD TEST EVALUATION Section.

(III) If reason 3 is selected an "I" (Inaccessible) will be written to the DLC TEST RESULT field in GAS.DAT. The GAS program shall return to display prompt [3.25(1)] if the OBD OR TSI OPTION field (13) of the PROGRAM.DAT file is "Y", if this field is "N" the GAS shall proceed to the OBD TEST EVALUATION Section.

(2) MIL BULB CHECK (KOEO)

The GAS shall prompt the inspector to locate the MIL on the dashboard of the vehicle under test to perform a visual check of the MIL. In accordance with EPA guidance, the integrity of the

MIL shall be determined during the check of the OBD system. The MIL should be able to be illuminated indicating a functional OBD system capable of warning the driver of possible problems. This step is to verify MIL bulb integrity.

Programming Criteria:

(a) The GAS shall prompt the operator to turn the key to the ON position, ask the inspector to observe the MIL for illumination, and store the results.

Display Prompt:

TURN THE IGNITION KEY TO THE ON POSITION.

DO NOT START ENGINE.

DID THE MALFUNCTION INDICATOR LIGHT (MIL) ILLUMINATE?

PRESS <F KEY A> **for YES, OR PRESS** <F Key B> **for NO**

NOTE: MALFUNCTION INDICATOR LIGHT (MIL) ILLUMINATION MAY BE CONTINUOUS, OR ONLY LAST A FEW SECONDS.

[Display OBD (21)]

1. If <F KEY A> for YES is pressed indicating bulb illumination, write a **"P"** to the MIL BULB KOEO field of the GAS.DAT and continue to the MIL COMMAND STATUS section.

2. If <F KEY B> for NO is pressed indicating the MIL does not illuminate, the program shall continue to the MIL COMMAND STATUS section ("F" remains in the MIL BULB KOEO field).

(3) MIL COMMAND STATUS (engine running)

The GAS shall communicate with the OBD system in the vehicle under test to determine if the OBD system has commanded the MIL to illuminate. In accordance with EPA guidance, the command status of the MIL of the OBD system shall be determined. This step is to evaluate the MIL command status of the OBD system with the engine running.

NOTE: The KOER manual test of the MIL bulb is not part of the Georgia OBD test based on data received from other states that this test causes confusion in their programs and is a redundant test of the MIL. The Federal EPA and Region 4 EPA have given Georgia approval to drop the KOER test.

(a) The GAS shall prompt the inspector to start the vehicle.

Display Prompt:

TURN THE IGNITION KEY TO START THE ENGINE AND ALLOW TO IDLE.

PRESS ENTER TO PROCEED.

[Display OBD (31)]

Programming Criteria:

1. If the GAS senses communication with the OBD system, it shall automatically display the following message:
   Display Prompt:
   COMMUNICATION IN PROGRESS, PLEASE WAIT
   [Display OBD (32)]

   (i) If a response is received from the OBD system, the GAS shall evaluate the MIL Command Status based on the data returned via the OBD link with the engine running. The following information shall be recorded to the GAS.DAT record: PID, PCM, and OBD VIN (if available), a "P" shall be written to the DLC TEST RESULT field of the GAS.DAT.

NOTE: Georgia recognizes that OBD VIN is not part of the SAE J1979 requirements, however the intention is to capture this information, if available, for future reference and audit procedures.

   (ii). If the MIL status returned is NOT commanded ON with the engine running a **"P"** shall be written to the MIL COMMAND STATUS field of the GAS.DAT, and then the program shall proceed to the OBD READINESS EVALUATION section,

   or

   (iii) If the MIL command status returned IS commanded ON the program shall proceed to the OBD READINESS EVALUATION section ("F" remains in the DLC TEST RESULT field).

2. If the GAS is told to continue due to enter being pressed at message OBD (31) but does not sense a signal at the DLC, the following prompt shall be displayed:

   Display Prompt:
   OBD COMMUNICATION CANNOT BE CONFIRMED.
   READJUST THE CONNECTOR AND TRY AGAIN.
   PRESS <F Key A> WHEN READY TO TRY AGAIN, OR.
   PRESS <F Key B> To FAIL THE TEST.
   [Display OBD (33)]

NOTE: The GAS must allow the I/M inspector unlimited attempts to gain a confirmed OBD connection.

   (i) If the inspector presses <F Key A>, the program shall loop back to the beginning of this section (MIL COMMAND STATUS) to reevaluate the DLC.

   ii) If the inspector presses <F Key B>, indicating that the OBD lead is connected, the program shall store an "N" in the DLC TEST RESULT field of the GAS.DAT and then proceed to the OBD TEST EVALUATION Section.

(4) OBD READINESS EVALUATION

The GAS shall communicate with the OBD system in the vehicle under test to determine if the OBD system has enough readiness monitors completed to allow an evaluation of the OBD system. In accordance with EPA guidance, the readiness of the OBD system for evaluation is

dependant on the year of the vehicle and in some instances on the model as well. This step is to store the status of the READINESS MONITORS in the OBD system with the engine running to allow the program to evaluate the stored results.

(a) **Programming Criteria**:

1. A request (in accordance with SAE J1979) shall be transmitted to the on-board computer to determine the readiness status of the OBD system monitors. The status of all readiness monitors shall be checked and stored.

2. Based on the returned data from the OBD computer, the GAS shall determine which readiness monitors are supported by the OBD system and the status of those supported monitors.

   (i) Possible monitors include the following:

   - Misfire (continuous)
   - Fuel system (continuous)
   - Comprehensive component (continuous)
   - Catalyst (once/trip)
   - Heated catalyst (once/trip)
   - Evaporative system (once/trip)
   - Secondary air system (once/trip)
   - Air conditioning system
   - Oxygen sensor (once/trip)
   - Oxygen sensor heater (once/trip)
   - EGR system (once/trip)
   - ~~Thermostat (continuous)~~
   - ~~PCV (continuous)~~

   (ii) Continuous monitors are those in which the applicable system/condition is checked continuously during vehicle operation; once/trip monitors are only checked when the vehicle is driven in a certain manner (i.e., over a predefined driving cycle expected to occur in customer service). According to Federal regulation (40 CFR 86.099-17), a vehicle manufacturer is not required to store a readiness code for the continuous operating monitors; however, some may choose to do so.

   (iii) Possible readiness code responses include: completed/ready, not completed/not ready, and not supported/not-enabled. A response that a monitor is not supported or not enabled means that for this particular vehicle that monitor is not applicable. Therefore, when a "not supported/not-enabled" response is given, the GAS shall not fail the vehicle for that code.

   (iv) All readiness monitor values shall be written to the appropriate test record fields in the GAS.DAT for each inspection using the following value format:

   - Not supported/Not Enabled = 0, or
   - Completed/Ready = 1, or
   - Not completed/Not Ready = 2.

(b) The GAS shall proceed to the DIAGNOSTIC TROUBLE CODE CHECK Section.

(5) DIAGNOSTIC TROUBLE CODE (DTC) CHECK

The GAS shall communicate with the OBD system in the vehicle under test to determine if there are DTCs stored in the computer of the vehicle under test. In accordance with EPA guidance, the DTCs of the OBD system under test will be printed and stored in the GAS.DAT file. This step is to pull all DTCs that are causing the OBD MIL to illuminate with the engine running.

(a) **Programming Criteria**:

1. The GAS shall evaluate the OBD system for the existence of stored DTCs. The GAS shall send a MODE $03 request to the on-board computer to determine all stored emissions-related powertrain trouble codes.

(i) If there are no DTCs: a "P" shall be written to both the OBD Fault Code Result and a **"0"** shall be stored in the DTC STORED field of the GAS.DAT, and the GAS shall proceed to the OBD TEST EVALUATION Section.

(ii) If any DTCs causing the MIL to be commanded on are found (not pending DTCs), THE FIRST FIVE (5) DTCs causing the MIL to be illuminated shall be printed on the VIR and recorded (maximum 5) in the DTC FAULT CODE field(s) of the GAS.DAT.

(iii) The total number of stored DTCs (not pending DTCs) causing the MIL to illuminate shall be stored in the DTC STORED field of the GAS.DAT and printed on the VIR.

(iv) The GAS shall proceed to the OBD TEST EVALUATION Section.

(6) OBD TEST EVALUATION and MESSAGES

Note: Print messages are found in Appendix K.

The result of the OBD section of the test will be determined as follows:

- MIL BULB KOEO is a manual entry
- DLC TEST RESULT is an automatic entry unless there is no communication between the vehicle and the GAS
- MIL COMMAND STATUS is an automatic entry unless there is no communication between the vehicle and the GAS.
- OBD READINESS RESULT is a field populated automatically unless there is no communication between the vehicle and the GAS.
- OBD FAULT CODE RESULT depends if there are any stored DTCs causing the MIL to illuminate.

Program Criteria:
Only use the readiness monitors for pass/fail determination if there is a match between the monitors "not ready" and the corresponding monitor field in the VRT.DAT (in the case of a vehicle match) or OBD_DFLT.DAT (if no vehicle match) for the vehicle under test.

If the monitor is supported but not ready and the corresponding field of the VRT.dat or

OBD_DFLT.DAT is a "Y" then that monitor shall count toward the count stored in the READINESS MONITORS NOT SET field of the GAS.DAT.

If the monitor is supported but not ready and the corresponding field of the VRT.dat or OBD_DFLT.DAT is an "N" then that monitor shall not count toward the count stored in the READINESS MONITORS NOT SET field of the GAS.DAT.

(a) The OBD READINESS RESULT field is determined by the following criteria: The Pass outcome requires that not more than a certain number of monitors return a value of not ready (example: value = 2). This number is found in the VRT field called MCOUNT and is the maximum number of non-continuous monitors allowed not ready and still PASS the OBD test. Continuous monitors are not to indicate, "Not Ready".

1. If a continuous monitor returns a not-ready status the OBD READINESS RESULT shall not be affected.
2. If there are fewer than the maximum non-continuous monitors not ready (less than or equal to MCOUNT) then a "P" shall be stored the OBD READINESS RESULT field of the GAS.DAT record, or
3. If too many non-continuous monitors are not ready (greater than MCOUNT) then the OBD READINESS RESULT shall remain "F".

(b)The following fields of the GAS.DAT must contain a "P" in order to pass the OBD test sequence: MIL BULB KOEO, DLC TEST RESULT, MIL COMMAND STATUS, and OBD READINESS RESULT.

1. If all the above fields contain a "P" then the program will store a "P" in the OVERALL OBD RESULT field and in the OVERALL VISUAL INSPECTION RESULT field of the GAS.DAT file and print a PASS in the OBD Test Result section on the VIR,

2. If any of the above fields contain a character other than a "P" then

   (i) If the DLC TEST RESULT field has a "C" stored in it then the following message shall be printed on the aborted VIR and ABORT shall be printed on the ADVISORY OBD VIR:

   OBD PRINT MESSAGE (01)

   (ii) if the DLC TEST RESULT field does not have a "C" then the program shall write an "F" to the OVERALL OBD RESULT field of the GAS.DAT file and a FAIL shall be printed on the ADVISORY OBD VIR.

(c) If the MY of the vehicle under test is 1996 or newer and the test date is prior to the PASS/FAIL (P/F) start date of OBD testing as defined in the PROGRAM.DAT file, OBD failures will not cause the vehicle to have an OVERALL I/M TEST FAILURE. Motorist information messages shall be printed on an Advisory OBD VIR to be given to the motorist informing them of problems with their vehicle's OBD system. The GAS shall proceed to perform a **TSI** emission test on failed OBD or aborted OBD tests during the advisory period.

NOTE: The Georgia OBD advisory period starts when the OBD software is loaded on an analyzer and ends when the OBD mandatory P/F date flag is set in the PROGRAM.DAT file. Currently the start date of P/F OBD is January 1, 2002.

1. The OVERALL OBD Test Result on the Advisory OBD VIR will be given a FAIL if an

"F" is stored in the OVERALL OBD RESULT field of the GAS.DAT or an ABORT if abort code 80 was stored during the KOEO procedure. The word ADVISORY shall be printed in the space provided for the certificate number.

NOTE: The failing or aborted OBD ADVISORY MESSAGE shall be printed prior to the tailpipe VIR.

2. If the value in the following fields is other than blank or **"**P**"** then the following message(s) shall be printed on the Advisory OBD VIR to inform the motorist of possible problems with their vehicle.

(i). If there is an "F" in the MIL KOEO field the following shall be printed:

OBD PRINT MESSAGE (02)

(ii). If there is a "D", or an "N" in the DLC TEST RESULT field the following message shall be printed on the Advisory OBD VIR indicating that the vehicle's on-board diagnostic system could not be checked due to a missing, damaged, or tampered connector,

OBD PRINT MESSAGE (03)

(iii). If there is an "I" in the DLC TEST RESULT field the following message shall be printed on the Advisory OBD VIR indicating that the vehicle's on-board diagnostic system could not be checked due to an inaccessible connector,

OBD PRINT MESSAGE (04)

(iv). If there is an "F" in the OBD READINESS field of the GAS.DAT the vehicle will be failed and the following message shall be printed on the Advisory OBD VIR:

OBD PRINT MESSAGE (05)

(v). If the MIL COMMAND STATUS field has an **"**F**"** stored in it, the following message shall be printed on the Advisory OBD VIR.

OBD PRINT MESSAGE (06)

(d) If the test year of the vehicle being tested is MY 1996 or later and the test date is after the mandatory P/F start date as defined in the PROGRAM.DAT file, OBD test results will be used to evaluate the Overall PASS/FAIL result of the vehicle being tested. The vehicle will receive a PASS of the OBD system if the OVERALL OBD RESULT field contains a **"**P**"**, or

1. If the OBD OVERALL RESULT is not "P" and

(i) if the result in the DLC TEST RESULT is a "C" (abort code 80) the following message shall be printed on the P/F VIR:

OBD PRINT MESSAGE (10)

(ii) the result in the OBD READINESS RESULT field is an "F" the following message shall be printed on the VIR: a "FAIL" shall be printed in the OVERALL OBD TEST RESULT section of the P/F VIR. A failed OBD vehicle shall receive a FUEL CAP

TEST.

OBD PRINT MESSAGE (11)

2. If the value in the following fields is other than blank or **"P"** then the following message shall be printed on the P/F VIR to inform the motorist of possible problems with their vehicle.

(i) If there is an **"F"** in the MIL KOEO field the following shall be printed on the P/F VIR:

OBD PRINT MESSAGE (12)

(ii) If there is a "D", or an "N" in the DLC TEST RESULT field the following message shall be printed on the P/F VIR indicating that the vehicle's on-board diagnostic system could not be checked due to a missing, damaged, or tampered connector,

OBD PRINT MESSAGE (13)

(iii). If there is an "I" in the DLC TEST RESULT field the following message shall be printed on the P/F VIR indicating that the vehicle's on-board diagnostic system could not be checked due to an inaccessible connector,

OBD PRINT MESSAGE (14)

(iv) If the MIL COMMAND STATUS field has an "F" stored in it the following message shall be printed on the P/F VIR:

OBD PRINT MESSAGE (15)

NOTE: A listing of the first five (5) DTCs with an appropriate label of the code associated with the failure shall be printed on the P/F VIR.

(e) The Gas shall proceed to the Fuel Cap test as described in section 3.30 and Appendix I unless the Random TSI field (6) of the PROGRAM.DAT field indicates that a TSI test should be performed.

1. If the Random TSI field (6) of the PROGRAM.DAT file is set to "N" then the GAS shall proceed to the Fuel Cap Testing routine as defined in Section 3.30 and Appendix I.

2. If the Random TSI field (6) of the PROGRAM.DAT file is set to "Y" then the GAS shall:

(i) Display the following informational message to the inspector to inform him/her that a TSI is about to be done on the vehicle being tested.

THIS VEHICLE HAS BEEN SELECTED TO ALSO RECEIVE A TAILPIPE TEST.

DO NOT ABORT THIS TEST,

THE TSI TEST THAT IS ABOUT TO BE RUN IS AN IMPORTANT PART OF THIS TESTING SEQUENCE.

Press <F Key> to Continue.

[DISPLAY OBD (61)]

(ii) When the inspector presses <F Key> to continue, the GAS shall proceed to the Tampering Inspection as defined in Section 3.26, the GAS shall store a "6" in the "REASON TSI TESTED" field (45) of the GAS.DAT indicating the TSI test was forced by the program, then proceed to perform a TSI tailpipe test prior to performing a fuel cap test.

NOTE: If the RANDOM TSI test is aborted by the inspector, the following message shall be displayed.

YOU HAVE CHOSEN TO ABORT THE RANDOM TSI TESTING SEQUENCE. THIS DECISION WILL BE STORED IN THE TEST RECORD. PRESS <F Key> TO CONTINUE.

[DISPLAY OBD (62)]

The program shall abort the testing sequence and issue a free abort, no fee due from motorist.

Appendix G - ASM2 Testing Sequence and Test Standards

The GAS shall look at the MANDATORY ASM field of the PROGRAM.DAT (12) to determine if the ASM2 test sequence is followed, or an ASM2525 test sequence only (MODE 1 of ASM2) is performed (advisory period). If there is an "N" in field (12) then the ASM2525 test shall be performed only. EPD expects this will be utilized only during the advisory period to subject all motorists to an ASM2525. Once field 12 of the PROGRAM.DAT is set to "Y" then the ASM2 mode shall be used. The GAS shall store an "A" in field 44 of the GAS.DAT to indicate an ASM test was started.

(1) The test sequence shall consist of an ASM2525 first mode as described followed by an ASM5015 second mode as described. Vehicles that fail the mode1 test shall receive a second chance (continuation of the mode1 test). Vehicles that fail the mode1 portion of the ASM test sequence shall not receive a second chance in mode2 (no continuation of mode 2) if mode 2 also has failing values. Vehicles that pass mode1 but failing mode2 shall receive a second chance at passing mode2 (continuation of mode2). Vehicles without catalytic converters (visual inspection result = "F") shall not receive a second chance for either mode1 or mode2 (mt_1 shall not go past 90 seconds, mt_2 shall not go past 60 seconds).

(2) The test sequence shall begin only after the following requirements are met:

(a) Load Setting. Prior to each mode, the system shall automatically select the load setting of the dynamometer from a supplied look-up table.

(b) Accessories. The vehicle shall be tested in as-received condition with all switchable accessories turned off. The engine shall be at normal operating temperature.

(c) Gear Selection. The vehicle shall be operated during each mode of the test with the gear selector in drive for automatic transmissions and in second (or third if more appropriate) for manual transmissions for the loaded modes. Engine RPM shall be measured per Section 6.03(4)(f).

(d) Sample Probe(s). The sample probe(s) shall be inserted into all vehicles' tailpipe(s) to a minimum depth of 10 inches. If the vehicle's exhaust system prevents insertion to this depth, a tailpipe extension shall be used.

(e) Multiple Exhaust Pipes. Exhaust GAS concentrations from vehicle engines equipped with functionally independent multiple exhaust pipes shall be sampled simultaneously (dual exhaust).

(f) Automatic GAS Zero. The analyzer shall conduct an automatic zero adjustment using the zero GAS specified in Section 6.04(4)(b)(3).

(g) Automatic Zero Adjustment. The zero adjustment shall include HC, CO, CO_2, and NO channels.

(h) Ambient Air and HC Hang-up Determination. The analyzer shall perform the automatic zeroing, O_2 calibration (if included), and ambient air reading, followed by an HC hang-up check. This process shall begin after initiation of data entry into the analyzer computer.

The analyzer shall be locked out from testing until (1) the ambient air (sampled through the probe) has less than 15 ppm HC and until the residual HC in the sampling system (probe sample - port sample) is less than 7 ppm.

(i) Engine Speed. Engine speed shall be monitored on all vehicles and recorded in the test record. For 1996 and newer vehicles equipped with Federal OBD systems or California OBD II systems, engine speed in RPM may be monitored via the standardized plug throughout the test. RPM readings displayed shall be updated on a second-by-second basis.

(3) Overall ASM2 Test Procedure: The test timer shall start (tt=0) when the conditions specified in paragraph (3)(b) of this section are met, the dynamometer rolls reach 1.0 mph due to the test vehicle's initial acceleration for testing purposes, and the mode timer initiates as specified in paragraph (3)(b)1. or (3)(c)1. of this section.

(a) Preconditioning Cycle. Vehicle preconditioning shall be performed prior to start of an official test. The Administrator must approve the preconditioning cycle. The following preconditioning cycle is approved:

The preconditioning timer shall start once the dynamometer has reached a speed of 25 mph. The vehicle will continue to be operated for a maximum of 30 seconds at this speed within ±5 mph and within ±10% of the wheel force tolerance specified in (3)(b) of this section. If operation of the vehicle falls outside the tolerances for speed and wheel force, the timer shall stop until the vehicle is back within tolerances. The duration of the preconditioning cycle may be adjusted if it is determined using statistical process control methods that alternative preconditioning cycle duration is adequate to ensure that vehicles are fully warmed up prior to testing. If the speed or wheel force falls above or below the tolerance, the preconditioning timer will reset to zero. Preconditioning time shall not be included in the overall maximum test time.

(b) ASM2525 Mode 1.

1. Mode 1 Timer. The mode timer shall start (mt_1=0) when the dynamometer speed (and corresponding wheel force) are maintained within 25±1.0 miles per hour for 5 continuous seconds. The dynamometer shall apply the correct wheel force based on the required ASM horsepower load at 25 mph across the testing speed window of 25±1.0 miles per hour, (i.e., constant torque load over the speed range). The wheel force tolerance shall be ± 5% of the correct wheel force at 25 mph.

2. Look-up Table. The dynamometer power shall be automatically selected from, the VRT based upon the vehicle-specific information contained in one VRT Row or on default vehicle information from the VRT, as outlined in the following table.

Vehicle Type / Number of Cylinders →	Default ASM2525 Actual Horsepower Settings For 8.6" Dynamometers $HP2525_8$				
	3	4	5 & 6	8	> 8
Sedans	6.7	9.5	11.5	13.7	13.3
Station Wagons	6.8	9.7	11.5	13.4	13.3
Mini-vans	8.8	11.7	13.2	14.9	15.3

Pickup Trucks	8.0	10.9	13.6	16.0	17.8
Sport/Utility	8.8	11.2	12.9	16.1	17.8
Full Vans	9.0	11.6	14.7	16.3	17.2

NOTE: If the dynamometer speed or wheel force falls outside the speed or wheel force tolerance for more than two consecutive seconds, or for more than 5 seconds total, the mode timer shall reset to zero and resume timing once the dynamometer speed or wheel force return within limits. The minimum mode length shall be determined as described in paragraph (3)(b)3.(i) of this section. The maximum mode length shall be 150 seconds elapsed time (mt_1 = 90+60).

3. Pass / Fail Determination. The pass/fail analysis shall begin after an elapsed time of 22 seconds (mt_1 = 22). A pass or fail determination shall be made for the vehicle and the mode shall be terminated as follows:

(i) Fast Pass/Passing ASM2525. The vehicle shall (fast) pass the ASM2525 mode if, at any point between an elapsed time of 22 seconds (mt_1 = 22) and 150 seconds (mt_1 = 150), the 10-second running average measured values for each pollutant are simultaneously less than or equal to the applicable test standards described in paragraph (a) of this section. If the vehicle fast passes the standards prior to mt=90 the GAS shall store a "P" in the Gross Polluter/Fast Pass Mode 1 (field 67).

(ii) Gross Polluter ASM2525. The vehicle shall be considered a Gross Polluter of the ASM2525 mode if, at an elapsed time of 90 seconds (mt1 = 90), the 10-second running average measured values for any pollutant is greater than 150% of the applicable test standards described in paragraph (a) of this section. If the 10-second running average measured value of any pollutant is over 150% (at mt_1 = 90) of the standard for the vehicle being tested the GAS shall store a "G" in the Gross Polluter/Fast Pass Mode 1 (field 67). If the "G" flag is set at mt_1 = 90 then Mode 1 shall end and the GAS shall proceed to Mode 2.

(iii) Failing ASM2525. If the vehicle is failing at the end of the first mode (mt_1= 90), then the test mode shall not end at 90 seconds but shall continue for up to an additional 60 seconds as long as the measured emissions values for HC, CO and NO are not greater than 150% of the applicable standard. The ending test results of the first mode shall be recorded in the test record.

The vehicle shall fail the ASM2525 mode if paragraph (3)(b)3.(i) of this section is not satisfied by an elapsed time of 150 seconds (mt_1 = 150).

(c) ASM5015 Mode 2

1. Mode 2 Timer . The mode timer shall start (mt_2=0) when the dynamometer speed (and corresponding wheel force) are maintained within 15±1.0 miles per hour for 5 continuous seconds. The dynamometer shall apply the correct wheel force based on the required ASM horsepower load at 15 mph across the testing speed window of 15±1.0 miles per hour, (i.e., constant torque load over the speed range). The wheel force tolerance shall be ± 5% of the correct wheel force at 15 mph.

2. Look-up Table. The dynamometer power shall be automatically selected from, the VRT based upon the vehicle-specific information contained in one VRT Row or on default vehicle information from the VRT, as outlined in the following table.

Vehicle Type / Number of Cylinders →	Default ASM5015 Actual Horsepower Settings For 8.6" Dynamometers $HP5015_8$				
	3	4	5 & 6	8	> 8
Sedans	7.9	11.4	13.8	16.4	16.0
Station Wagons	8.1	11.7	13.8	16.1	16.1
Mini-vans	10.2	14.1	15.8	17.9	18.2
Pickup Trucks	9.6	13.1	16.4	19.2	21.1
Sport/Utility	10.1	13.4	15.5	19.4	21.1
Full Vans	10.3	13.9	17.7	19.6	20.5

NOTE: If the dynamometer speed or wheel force falls outside the speed or wheel force tolerance for more than two consecutive seconds, or for more than 5 seconds total, the mode timer shall reset to zero and resume timing. The minimum mode length shall be determined as described in paragraph (c)(3)(i) or (c)(3)(ii) of this section. The maximum mode length shall be 90 seconds elapsed time ($mt_2 = 90$).

3. Pass / Fail Determination. The pass/fail analysis shall begin after an elapsed time of 22 seconds ($mt_2 = 22$). A pass or fail determination shall be made for the vehicle and the mode shall be terminated as follows:

(i) Fast Pass/Passing ASM5015. The vehicle shall (fast) pass the ASM5015 mode if, at any point between an elapsed time of 22 seconds ($mt_2 = 22$) and 60 seconds (mt2 = 60), the 10-second running average measured values for each pollutant are simultaneously less than or equal to the applicable test standards described in paragraph (a) of this section. If the vehicle fast passes the standards prior to mt_2= 60 the GAS shall store a "P" in the Gross Polluter/Fast Pass Mode 2 (field 83).

(ii) Gross Polluter ASM5015. The vehicle shall be considered a Gross Polluter of the ASM5015 mode if, at an elapsed time of 60 seconds ($mt_2 = 60$), the 10-second running average of measured values for any pollutant is greater than 150% of the applicable test standards described in paragraph (a) of this section. If the 10-second running average measured value of any pollutant is over 150% (at $mt_2 = 60$) of the standard for the vehicle being tested the GAS shall store a "G" in the Gross Polluter/Fast Pass Mode 2 (field 83) and mode 2 shall stop (no continuation of mode 2). The GAS shall end the test and store the ending values in the appropriate fields of the GAS.DAT.

(iii) Failing ASM5015. If the vehicle is failing at the end of the first mode, then the test mode shall not end at 60 seconds but,

(I) If the 10-second running average measured value of any pollutant is over 100% of the standard for the vehicle being tested (at $mt_2 = 60$) but less than 150%, and the vehicle PASSED mode 1, the GAS shall allow the mode 2 to continue for up to an additional 90 seconds (mt_2=150).

(II) If the 10-second running average measured value of any pollutant is over 100% of the standard for the vehicle being tested (at $mt_2 = 60$) and the vehicle FAILED mode 1, the GAS shall not proceed. The GAS shall end the test and store the ending values in the appropriate fields of the GAS.DAT.

The vehicle shall fail the ASM5015 mode if paragraph (3)(c)3.(i) of this section is not satisfied by an elapsed time of 150 seconds ($mt_2 = 150$).

Appendix H - TSI Preconditioning and Testing Sequence

H.01 Emissions Test - Two-Speed Idle Procedures

(1) The following TSI test sequences shall be used by the GAS to test covered vehicles that have been determined by a licensed ASM inspector not to be ASM testable, or which have been selected by the GAS to receive a TSI test. The GAS shall store a "T" in field 44 of the GAS.DAT file if a TSI test is the only test performed (do not overwrite a "O" with a "T" if this is a random TSI). Test sequences shall be determined from the year, make, model, and transmission. When the vehicle has met RPM, flow rate, and dilution conditions, the emissions test sequence shall begin and the display shall show the word “TESTING” and time remaining in the test sequence. The analyzer shall record the emission reading at the end of the “TESTING” period, for each test mode.

Note: 2500 rpm standards exist for all vehicles. The following rules shall apply:

(a) If the vehicle being tested is:

1. A 1981-84 Ford Motor Company passenger car with a 5.8 Liter (351 CID) engine it shall be tested using Sequence # 2. See (c) below.

2. A 1984 Jeep with a 2.5 Liter (150 CID) light duty tuck it shall be tested using test sequence # 3. See (d) below.

3. A 1984-87 BMWs with an automatic transmission, 1983 -88 Volvo with an automatic transmission or a 1986- 92 Peugeot with an automatic transmission it shall be tested using test Sequence #5. No test results will be displayed on the VIR for the 2500 RPM portion of the test. See (f) below.

4. A 1985 Ford ranger with a 2.3 Liter (140 CID) engine light duty truck or a 1986 Ford Ranger or Aerostar with a 2.3 L (140 CID) engine light duty tuck it shall be tested using test sequence #6. See (g) below.

5. If the vehicle being tested does not meet any of the previous criteria it shall be tested using Sequence # 1 See (b) below.

(b) SEQUENCE #1: Testing period: 30 seconds for each stage

First stage: 2500 RPM (± 10 %)

Second stage: Idle RPM

Basis for test results: Average of last 5 seconds of each sampling period.

Units of test results: Concentration measurements: ppm HC, % CO, % O2 (optional) and % CO2

(c) SEQUENCE #2: Testing period:30 seconds for each stage

Note: Prior to initiating the test, the inspector shall be informed that the vehicle they will be testing will require special test procedures and that it is important to

follow directions carefully. The inspector shall then be prompted to turn the key off for 10 seconds.

TURN THE ENGINE OFF FOR 10 SECONDS

[Display APP-H(1.1)]

or,

THE ENGINE WAS NOT TURNED OFF FOR 10 SECONDS, TURN KEY TO THE OFF POSITION

[Display APP-H(1.2)]

At the end of 10 seconds, the analyzer shall prompt the inspector to restart the engine and begin the 2500 RPM test. The analyzer shall ensure that there is no RPM signal for 10 seconds prior to starting the 2500 RPM test.

START THE ENGINE AND RAISE THE RPM TO 2500 TO START THE TEST

[Display APP-H(1.3)]

First stage: 2500 RPM (± 10 %)

Note: between the test stages the inspector shall be prompted to turn the ignition off for 10 seconds. The analyzer shall ensure that there is no engine RPM signal for at least 10 seconds. At the end of 10 seconds, the analyzer shall prompt the inspector to restart the engine and begin the idle test.

ALLOW THE ENGINE TO IDLE

[Display APP-H(1.4)]

Second stage: Idle RPM (see standards for max.)

Basis for test results: After the first 15 seconds of each stage, and passing reading (averaged over 5 consecutive seconds) collected during each sampling period or if none, over the last 5 seconds.

Units of test results: Concentration measurements: ppm HC, % CO, % O2 (optional) and % CO2

Each test stage of test sequence #2 could take as little as 20 seconds if test conditions are satisfied and the vehicle meets the standards. If the emissions are not within the standards for any 5-second period (following the initial 15-second period), the test shall run the full 30 seconds.

(d) SEQUENCE #3: Testing period: 30 seconds for each stage

Note: Before the 2500 RPM test starts, the analyzer shall display a message to the inspector indicating that the engine RPM cannot exceed 2650 for this vehicle.

ENGINE RPM MUST NOT EXCEED 2650 DURING THE TEST

[Display APP-H(1.5)]

First stage: 2500 RPM (+ 6 % , - 10 %)

Second stage: Idle RPM (see standards for max.)

Basis for test results: Average of the last 5 seconds of each sampling period.

Units (e) SEQUENCE of test results: Concentration measurements: PPM HC, % CO, % O2 (optional) and % CO2

Test sequence #4 is not used.

(f) SEQUENCE #5:
Given the problems with the ZF automatic transmission, the State prefers that the affected vehicles be tested at their dealerships. Accordingly, if the inspector enters an "A: (for automatic) for the transmission type, and if the vehicle make, model and model year match BMW/Peugeot/Volvo criteria, the GAS shall display the following message:

BECAUSE OF THE POSSIBILITY OF TRANSMISSION DAMAGE TO THIS VEHICLE, DO NOT RAISE THE ENGINE SPEED ABOVE IDLE. PRESS "ENTER" TO CONTINUE. IF NOT, PRESS "ESC" TO ABORT THE TEST.
[Display APP-H(1.6)]

If the inspector wishes to abort the test and presses the ESC key, the GAS shall automatically select Abort Code 90 (BMW/PEUGEOT/VOLVO AUTO TRANS) and shall issue a VIR.

Note: If the inspector chooses to continue testing this vehicle, display the following message before beginning the test sequence.

BEFORE BEGINNING THE EMISSIONS TEST, MAKE SURE THE ENGINE IS AT NORMAL OPERATING TEMPERATURE. IF NOT, THE VEHICLE SHOULD BE DRIVEN UNTIL IT IS. DO NOT WARM THE ENGINE BY RAISING THE RPM ABOVE IDLE WHILE THE TRANSMISSION IS IN PARK OR NEUTRAL.
[Display APP-H(1.7)]

Testing period: 30 seconds for each stage

Engine Speed:Idle RPM [Note: one stage only]

Basis for test results: Average of the last 5 seconds of the sampling period.

Units of test results: Concentration measurements: PPM HC, % CO, % O2 (optional) and % CO2

(g) SEQUENCE #6:
Testing period: 30 seconds for each stage

First stage: 2500 RPM (±10%)

Second stage: Idle RPM

Basis for test results:
Stage 1: Average of last 5 seconds of sampling period.

Stage 2: Same as stage 1; however, if the emissions are not within the standards and the idle RPM was below 900, then the inspector shall be prompted to rev the engine so that the idle speed is a minimum of 900 RPM (but not to exceed the manufacturer's

specifications), and to continue the test for another 30-Second-Stage Idle Test. After the first 15 seconds of the repeated second stage, any passing reading (averaged over 5 consecutive seconds) collected during the sampling period, or, if none, the average reading over the last 5 seconds of the stage.

Units of test results: Concentration measurements: PPM HC, % CO, % O2 (optional) and % CO2

(h) Accommodations shall be made to allow for additional test sequences and sampling periods, which can be added later.

(2) Commencement of the Emissions Sampling Period -Two-Speed Idle

(a) Immediately before starting the emissions test, manufacturers shall require the operator to verify that the type of ignition system entered is correct and allow the inspector to change it if it is incorrect. The sampling period shall commence as soon as stability is achieved. Stability is achieved when all of the following conditions are satisfied:
1. Readings averaged over a period of two seconds for CO+CO2 meet the dilution thresholds;
2. Engine RPM has been within specified thresholds for at least one second; and
3. Sample flow rate is adequate to prevent triggering the low flow lockout.

(b) After stability has been achieved and sampling has been initiated, if any of the following conditions occur, the test mode must be restarted:
1. The dilution level is below the specified threshold.
2. Engine RPM is outside the specified thresholds.
3. Sample flow rate is not adequate to prevent triggering the low flow lockout.

(c) Exceeding the RPM limits, not reaching the dilution threshold or a low flow rate during the testing period shall automatically cause the testing period to restart for that mode. After three attempts, and each subsequent attempt, the GAS shall display either one of the following two messages (exact words do not have to be used):

DO YOU WISH TO ABORT THE TEST? YES/NO

[Display APP-H(1.8)]

SAMPLE DILUTION EXCEEDED

[Display APP-H(1.9)]

RPM LIMITS EXCEEDED

[Display APP-H(1.10)]

LOW FLOW RATE LIMITS EXCEEDED

[Display APP-H(1.11)]

1. If the first message is displayed, the inspector must respond to the question prior to proceeding. If the second, third, or fourth message is displayed, the message will remain displayed until the sample dilution, RPM limits, and low flow conditions are within specifications, or the operator has manually aborted the test.

Program Criteria:
If the inspector aborts a RANDOM TSI test following an OBD test, the TSI test shall end. Gas

readings shall be stored in the appropriate fields as outlined in (2)(c)2 below. Random TSI tests are not to be used for PASS/FAIL criteria after an OBD test and are for program evaluation only.

2. If the emissions test must be aborted after the sampling period has started, the latest five-second average (or the average of whatever portion of the first five seconds of the sampling period has elapsed) shall be treated as the “final value". Emission readings shall be taken during all test modes and the “final” reading shall be recorded on the test record and the VIR, except that no emission readings or pass/fail result shall be displayed on the VIR if any portion of a test which is aborted due to improper RPM, excessive dilution or low flow (i.e., display test results only if it is a valid test). Valid results from the 2500 RPM portion of a test shall be displayed, even if the test is aborted during the idle portion.

(3) Dilution Correction Factor - Two-Speed Idle

The emission results on the VIR and stored in the test record shall be the measured results multiplied by the calculated dilution correction factor as described under the ASM test procedure.

(4) Vehicle Preconditioning - Two-Speed Idle

(a) If a vehicle fails any of the emission tests and if it is a 1975 or newer model year vehicle, the analyzer shall instruct the inspector to precondition the vehicle and run a second test.

(b) Preconditioning is not required if the tampering inspection result for the catalytic converter is entered as an “F”. Based on studies conducted on suspected pattern failures by the EPA, 1975 and later model vehicles failing an initial test should be preconditioned in the following manner, and retested:

H.02 Vehicle Preconditioning Procedure (Two-Speed Idle

At the start of the preconditioning sequence, the inspector shall be prompted to remove the probe(s) from the tailpipe(s). The GAS shall monitor the probe to ensure the probe(s) has been removed.

REMOVE THE PROBE FROM THE TAILPIPE.

[Display App-H (2.1)]

Procedure #1:

For 1981-86, ford MOTOR COMPANY VEHICLES and 1984-85 Honda Preludes:

OPERATE THE VEHICLE AT 2500 +300 RPM FOR 3 MINUTES WITH THE TRANSMISSION IN "PARK" OR "NEUTRAL".

AT THE END OF THE 3-MINUTE PERIOD, ALLOW THE VEHICLE TO RETURN TO IDLE AND IMMEDIATELY TURN THE IGNITION OFF.

INSERT THE PROBE INTO THE TAIL PIPE.
LEAVE THE IGNITION OFF FOR 10 SECONDS THEN RESTART THE ENGINE AND PROCEED IMMEDIATELY WITH THE EMISSIONS TEST.

[Display App-H (2.2)]

Procedure #2:

For All Other 1975 and Newer Model Year Vehicles

OPERATE THE VEHICLE AT 2500 + 300 RPM FOR 3 MINUTES WITH THE TRANSMISSION IN "PARK" OR "NEUTRAL".

AT THE END OF THE 3-MINUTE PERIOD, ALLOW THE VEHICLE TO RETURN TO IDLE AND STABILIZE FOR 10 SECONDS, BUT DO NOT TURN THE IGNITION SWITCH OFF.

INSERT THE PROBE INTO THE TAILPIPE.

AT THE END OF THE 10 SECOND PERIOD, IMMEDIATELY BEGIN THE EMISSIONS TEST.

[Display App-H (2.3)]

Procedure #3:

For all 1984-87 BMWs with automatic, 1986- 92 Peugeots with automatic, and 1983-88 Volvos with automatic.

If the vehicle fails the first chance test, display the following message:

DUE TO POSSIBLE TRANSMISSION DAMAGE, DO NOT RAISE THE ENGINE SPEED ABOVE IDLE RPM WHILE THE TRANSMISSION IS IN NEUTRAL OR PARK. IF THE VEHICLE NEEDS TO BE PRECONDITIONED, DRIVE IT UNTIL IT HAS REACHED OPERATING TEMPERATURE.

[Display App-H (2.4)]

The analyzer shall start the second chance test immediately after the vehicle has reached operating TEMPERATURE and as soon as the GAS detects engine RPM within the idle RPM range. The GAS shall perform the emissions measurement at idle for 30 seconds. After the second chance, the GAS shall allow the inspector to continue with the remainder of the inspection.

The manufacturer shall provide for the capability to utilize as many different preconditioning procedures as can be contained in the analyzer. The preconditioning procedure number shall be documented on the test record.

Programming Criteria

a. The analyzer shall automatically instruct the inspector to initiate the preconditioning sequence whenever a 1975 or newer model year vehicle fails the emissions test before the test can proceed. The analyzer software shall select and display only the appropriate preconditioning procedure based on the vehicle make and model year information entered by the inspector.

b. If the vehicle is a 1975 or newer model, a message shall be displayed instructing the inspector to remove the exhaust probe and increase the engine RPM to 2500 (+300) and hold it there for 3 minutes. The analyzer shall detect a signal in the proper range for 3 minutes within a 3-minute and 30-second period. A message shall be displayed instructing the inspector to adjust the engine RPM, restart the test or abort the test as appropriate if the RPM is outside of the specified limits. The preconditioning period shall begin as soon as the engine RPM is stable (for a period of 1 second) and in the proper range. To avoid

loading the sample system with vehicle exhaust during the preconditioning process, the analyzer shall either back purge during the preconditioning sequence or prevent preconditioning if the probe is in the tailpipe. Preconditioning prevention could be determined by checking for emissions prior to or during the preconditioning sequence.

Note: In the following two paragraphs, the 30-second period referred to below may be extended to 60 seconds, at the option of the manufacturer.

When the preconditioning period is complete, the inspector shall be instructed to allow the vehicle to return to idle and the analyzer shall ensure that the engine speed is reduced for at least 10 seconds, but no more than 30 (60) seconds. If the engine speed is reduced for less than 10 seconds or more than 30 (60) seconds, a message shall be displayed instructing the inspector to either restart the preconditioning sequence or abort the test. Messages indicating the appropriate ignition key on/off and retest instructions shall be displayed at the end of the 10-second idle period. The inspector shall be instructed to strike the "ENTER" key as soon as possible after 10 seconds of idling has occurred.

Following the 10 to 30 (or 60)-second idling period (terminated when the inspector strikes the "ENTER" key), the inspector shall be allowed an additional 30 (60) seconds maximum to perform the ignition key off/on sequence (if appropriate), insert the probe in the tailpipe and increase the engine RPM to 2500 +250. A message shall be displayed advising the operator of the allowable time remaining before the emissions test has to be initiated (indicated by the analyzer detecting the key off/on procedure, where appropriate, an engine RPM of 2500 +250 and meeting dilution requirements) or the preconditioning sequence shall be performed again or the test aborted.

c. The analyzer shall display the engine speed and the time remaining during each stage of the preconditioning sequence. The number of the preconditioning sequence shall be recorded on the test record automatically by the analyzer. If no preconditioning sequence was used (vehicle passed the emissions portion of the test the first time, was pre-75, or the test was aborted), this record should be filled with a zero.

d. Error Messages:

NO RPM SIGNAL - MAKE SURE THE TACH LEAD IS CONNECTED

[Display App-H (2.5)]

ENGINE SPEED DROPPED BELOW 2200 RPM - RAISE THE ENGINE SPEED TO 2500 AND HOLD FOR 3 MINUTES

[Display App-H (2.6)]

ENGINE SPEED INCREASED ABOVE 2800 RPM - REDUCE ENGINE SPEED TO 2500 AND HOLD FOR 3 MINUTES

[Display App-H (2.7)]

PROBE IS IN THE TAILPIPE, REMOVE THE PROBE TO CONTINUE.

[Display App-H (2.8)]

Appendix I - Fuel cap Test Procedure

(1)The GAS must automatically and correctly prompt the inspector to perform the leak check described and automatically record the P/F results.

(a) The program in the GAS shall prompt the inspector for a second fuel cap and store the results of the second cap if tested.

(b) The program in the GAS shall, after a failed test, prompt the inspector if the same cap is to be retested, or the cap is to be replaced and the replacement cap tested, or failed if the motorist does not wish to replace the cap.

(2) Pre-inspection and preparation

(a) If the cap is missing, the fuel cap shall fail the test. The GAS shall prompt to allow a replacement of the cap prior to the final determination.

(b) Fuel cap available and testable: The cap shall be removed and tested only when prompted by the program.

(c) Fuel cap untestable: The cap is considered untestable if it is present, but there is no current adapter to fit the cap as indicated by the most recent fuel cap testing application guide.

(3) Fuel cap integrity test sequence

(a) The adapter appropriate for the fuel cap shall be fitted to the test device.

(b) The fuel cap shall be installed on the adapter and the test device pressurized to 30 inches of water.

(c) The fuel cap leak rate shall be compared to an orifice with a flow rate of 60 cc/min at 30 inches of water.

(d) If the leak rate exceeds 60 cc/min, the cap shall fail the test.

Program Criteria:

(1) The GAS may prompt the inspector with the appropriate adapter, or indicate that the fuel cap is untestable, but must indicate that the inspector should refer to the most recent fuel cap testing application chart. The tester shall automatically pressurize the fuel cap, and indicate when the test has commenced and when it has ended. The fuel cap tester shall indicate whether the fuel cap has passed or failed, and automatically enter the test result into the GAS.DAT. The fuel cap tester shall allow the inspector to test caps that are attached to vehicles.

REFER TO THE MOST RECENT FUEL CAP APPLICATION CHART AND PERFORM FUEL CAP INSPECTION Or,

IF NO FUEL CAP ADAPTOR AVAILABLE OR IF NOT TESTABLE, PRESS <F Key1>,

IF FUEL CAP IS MISSING PRESS <F Key2>.

PRESS "ENTER" TO PROCEED.

[Display FC(1)]

(a) If the ENTER key is pushed the GAS shall perform a Fuel Cap Test.

(b) If the <F Key1> is pressed the GAS shall store a "N" in the appropriate FUEL CAP RESULT field of the GAS.DAT (141 for cap #1, 142 for cap #2).

(c) If the <F Key2> is pressed the GAS shall store a "M" in the appropriate FUEL CAP RESULT field of the GAS.DAT (141 for cap #1, 142 for cap #2).

(2) When the fuel cap inspection is completed, the result shall be displayed.

PASSED FUEL CAP TEST, PRESS, "ENTER" TO PROCEED. Or,

[Display FC(2)]

FAILED FUEL CAP TEST! PRESS <F Key> TO RETEST THIS FUEL CAP.

DOES THE CUSTOMER WISH TO REPLACE THE CAP?
ENTER "Y" FOR YES OR "N" FOR NO.

[Display FC(3)]

(a) If <F Key> is pressed, the GAS shall retest the fuel cap and indicate the result. If the fuel cap passes a, "T" shall be stored in the appropriate FUEL CAP TEST RESULT field of the GAS.DAT. The GAS shall only allow one retest of a fuel cap (i.e.: after the second test on a cap it shall pass/fail or be replaced.

(b) If "NO", the inspection shall store an "F" in the appropriate FUEL CAP TEST RESULT field of the GAS.DAT and then continue.

(c) If "YES", the inspector shall insert the replacement fuel cap in the adaptor and repeat the test. Replacement fuel caps shall be allowed one retest in the case of a failure of the replacement cap during the first check.

INSERT NEW FUEL CAP IN ADAPTOR AND PRESS "ENTER" TO PROCEED.

[Display FC(4)]

(3) If the new cap passes the test, the inspection shall store a "R" in the FUEL CAP #1 TEST or FUEL CAP #2 TEST result field as appropriate. If the replacement cap fails, display the following message:

REPLACEMENT FUEL CAP FAILED. DO YOU WANT TO RETEST?
ENTER "Y" OR "N".

[Display FC(5)]

(a) If "NO", store an "F" in the appropriate field for the FUEL CAP TEST RESULT (fields 141, 142), and then continue,

(b) IF "YES", repeat the previous step FC(4). The GAS shall allow for one retest of a replacement cap if the first check fails.

1. If the retest of the replacement Fuel Cap results in a PASS, the "R" shall not be overwritten (GAS.DAT to record the replacement), or
2. If the retest of the replacement Fuel Cap results in a FAIL, the "R" shall be

overwritten with an "F" to indicate the failed Fuel Cap.

Programming Criteria

a. The acceptable final test results for the fuel cap test entered into the test record shall be "P" for an initial pass "T" for caps that are Tested again and passed, "F" for fail, "R" for replaced during the test and passed, "M" for missing and not replaced, and "N" for Not testable.

b. The inspector may repeat the retest of the original cap or replacement cap only once as noted above.

c. After the first fuel cap is tested or bypassed, the GAS shall prompt for a second cap.

DOES THE VEHICLE HAVE A SECOND FUEL CAP?

ENTER "Y" OR "N"

[Display FC(6)]

If "Y" is pressed then the fuel cap test sequence shall be repeated for the second fuel cap. The proper test result shall be stored in the FUEL CAP #2 TEST field 142 of the GAS.DAT.

If "N" is pressed the fuel cap test sequence shall be terminated, a blank shall be stored in FUEL CAP#2 TEST field 142of the GAS.DAT.

(d) The FUNCTIONAL CHECK RESULT field 143 of the GAS.DAT shall be:

1. Populated with a "P" if FUEL CAP #1 TEST field 141 has a "P", "T", "R", or an "N" and FUEL CAP #2 TEST field 142 has a "P", "T", "R", "N", or is blank.

2. Populated with an "F" if either FUEL CAP#1 TEST or FUEL CAP #2 TEST has an "F", or an "M" stored.

Appendix J - List of Abbreviations

CARB California Air Resources Board
BAR California Bureau of Automotive Repair
BIOS Basic Input Output System
CAT Catalytic Converter
Cm Centimeters
CO Carbon Monoxide
CO_2 Carbon Dioxide
Cyl Cylinder
DCF Dilution Correction Factor
ECS Emission Control System
EPA Environmental Protection Agency
EPD Environmental Protection Division
ESC Emission Standards Category
F Fahrenheit
F Fail
Fed Federal
GVWR Gross Vehicle Weight Rating
GAS Georgia Analyzer System
HC Hydrocarbon
Hp Horsepower
I/M Inspection/Maintenance
K Emission Reduction Factor
l Liters
LIC License
lpm Liters per minute
N None
NIST National Institute for Standards and Technology
NO Nitric Oxide
NOx Oxides of Nitrogen
OBD On-board Diagnostics
OEM Original Equipment Manufacturer
OS Operating system
O_2 Oxygen
P Pass
PPM Parts Per Million
RPM Revolution Per Minute
VEC Vehicle Emission Control label
VID Vehicle Inspection Database
VIN Vehicle Identification Number
VIR Vehicle Inspection Report
VRT Vehicle Reference Table
Number

Appendix K – GAS Print Messages

The following text messages shall be updateable via the VID.

APP-K.01 Emission Repair Form

Below is the text message that shall be printed as the header on the EMISSION REPAIR FORM. This header is to be printed between the heading "EMISSION REPAIR FORM" and the vehicle information block. See section 5.05.

In order to have your vehicle re-inspected (free or paid), this form MUST be completed and presented to the inspector. Under no circumstance is a vehicle to be re-inspected without a completed form. It is a violation for the inspector to re-inspect vehicles without a completed form.

VIR Message[RFM(1)]{VIRRFM01}

Before any repairs are paid for, you should make certain your mechanic will complete this form so you can receive your re-inspection.

For each paid inspection performed on your vehicle you are entitled to one FREE re-inspection, if you return to the same inspection station within 30 days. Note: The initial test date is day 1.

VIR Message[RFM(2)]{VIRRFM02}

```
EMISSION STATION OWNERS MUST RETAIN THIS COMPLETED FORM AND SUBMIT TO GCAF.
VEHICLE OWNERS ARE TO RETAIN REPAIR RECEIPTS.
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VIR Message[RFM(3){VIRRFM03}]

APP-K.02 OBD VIR Messages

VID updateable OBD messages for the VIR will be here as soon as the Ca Add 7 document is procured and the methodology is discussed with the equipment manufacturers.

In an attempt to perform an On-Board Diagnostic (OBD) test on your vehicle's on-board computer the INSPECTOR was not able to locate the Diagnostic Link Connector (DLC) for the OBD system. A mandatory OBD inspection will be required for next year's vehicle registration.
{Text subject to change}

OBD PRINT MESSAGE (1){OBDPMF01}

Based on the information received during the On-Board Diagnostic (OBD) test, your Malfunction Indicator Light (MIL) did not illuminate properly. This vehicle must have the MIL functioning properly to pass the vehicle inspection. You should contact your service professional to complete the necessary repairs.
{Text subject to change}

OBD PRINT MESSAGE (2){OBDPMF02}

In an attempt to perform an On-Board Diagnostic (OBD) test on your vehicle's on-board computer the Diagnostic Link Connector (DLC) for the OBD system was found to be damaged or the computer is not responding. A mandatory OBD inspection will be required for next year's vehicle registration.
{Text subject to change}

OBD PRINT MESSAGE (3){OBDPMF03}

In an attempt to perform an On-Board Diagnostic (OBD) test, your vehicle was found to have an

inaccessible Diagnostic Link Connector (DLC). The DLC must be accessible to allow the test of the OBD computer system. A mandatory OBD test will be required for next year's vehicle registration.
{Text subject to change}

OBD PRINT MESSAGE (4){OBDPMF04}

Based on information obtained from the On-Board Diagnostics (OBD) Computer in the vehicle, the OBD system is not ready to make a determination regarding the pollution control systems on the vehicle. This situation should be corrected. A mandatory OBD inspection will be required for next year's vehicle registration. See your owner's manual for information on "OBD/Readiness driving procedures" or contact your service professional.
{Text subject to change}

OBD PRINT MESSAGE (5){OBDPMF05}

Based on information obtained from the On-Board (OBD) Computer in the vehicle, the OBD system has determined that there is a problem with the pollution control systems on your vehicle. A mandatory OBD inspection will be required for next year's vehicle registration. You should contact your service professional to complete the necessary repairs. A mandatory OBD inspection will be required for next year's vehicle registration.
{Text subject to change}

OBD PRINT MESSAGE (6){OBDPMF06}

In an attempt to perform an On-Board Diagnostic (OBD) test on your vehicle's On-Board computer the INSPECTOR was not able to locate the Diagnostic Link Connector (DLC) for the OBD system. This vehicle must have the DLC available to conduct the vehicle inspection. If you have questions regarding this test, ask the inspector who performed this test, or your service professional.
{Text subject to change}

OBD PRINT MESSAGE (10){OBDPMF10}

Based on information obtained from the On-Board Diagnostic (OBD) Computer in the vehicle, the system is not ready to make a determination regarding the pollution control systems on the vehicle. This situation must be corrected before your vehicle's OBD system can complete it's self test prior to being reinspected and registered. See your owner's manual for information regarding the OBD system or contact your service professional for assistance.
{Text subject to change}

OBD PRINT MESSAGE (11){OBDPMF11}

Your vehicle FAILED the On-Board Diagnostic (OBD) test. Based on the information received during the test, the OBD Malfunction Indicator Light (MIL) did not illuminate. This vehicle must have the OBD system functioning properly to pass the vehicle inspection. Have your service professional make the necessary complete repairs prior to reinspection
{Text subject to change}

OBD PRINT MESSAGE (12){OBDPMF04}

Your vehicle FAILED the On-Board Diagnostic (OBD) test. In an attempt to perform an OBD test on your vehicle's on-board computer the Diagnostic Link Connector (DLC) for the OBD system was found to be damaged or the computer is not responding. This vehicle must have the On-Board Computer system functioning properly to pass the vehicle inspection to register this vehicle. Have your service professional make the necessary complete repairs prior to reinspection.
{Text subject to change}

OBD PRINT MESSAGE (13){OBDPMF13}

In an attempt to perform an On-Board Diagnostic (OBD) test, your vehicle was found to have an inaccessible Diagnostic Link Connector (DLC). The DLC must be accessible to allow the test of the OBD computer system to register this vehicle.
{Text subject to change}

OBD PRINT MESSAGE (14){OBDPMF14}

Your vehicle has FAILED the On-Board Diagnostic(OBD) Computer test. The OBD system has determined that there is a problem with the pollution control system on your vehicle. This situation must be corrected before the OBD system can be reinspected which will allow this vehicle to be registered. Have your service professional make the necessary complete repairs prior to reinspection.
{Text subject to change}

OBD PRINT MESSAGE (15){OBDPMF15}

APP-K.03 ASM VIR Messages

VID updateable ASM messages for the VIR will be here as soon as the Ca Add 7 document is procured and the methodology is discussed with the equipment manufacturers.

The Georgia Emission Test Program is helping to clean up Atlanta's air - and you are doing your part. Motor vehicles are driven over 115 million miles each day in Atlanta and are responsible for half of the pollutants in Atlanta's air. Keeping your vehicle tuned up and in good running condition is the most important thing you can do to keep our air clean and protect the health of all our citizens.

VIR PRINT MESSAGE (1){VIRPMA01}

Your vehicle failed the inspection. Repairs are needed to reduce emissions. You MUST present a completed repair form and this report to obtain a re-inspection.

VIR PRINT MESSAGE (2){VIRPMF02}

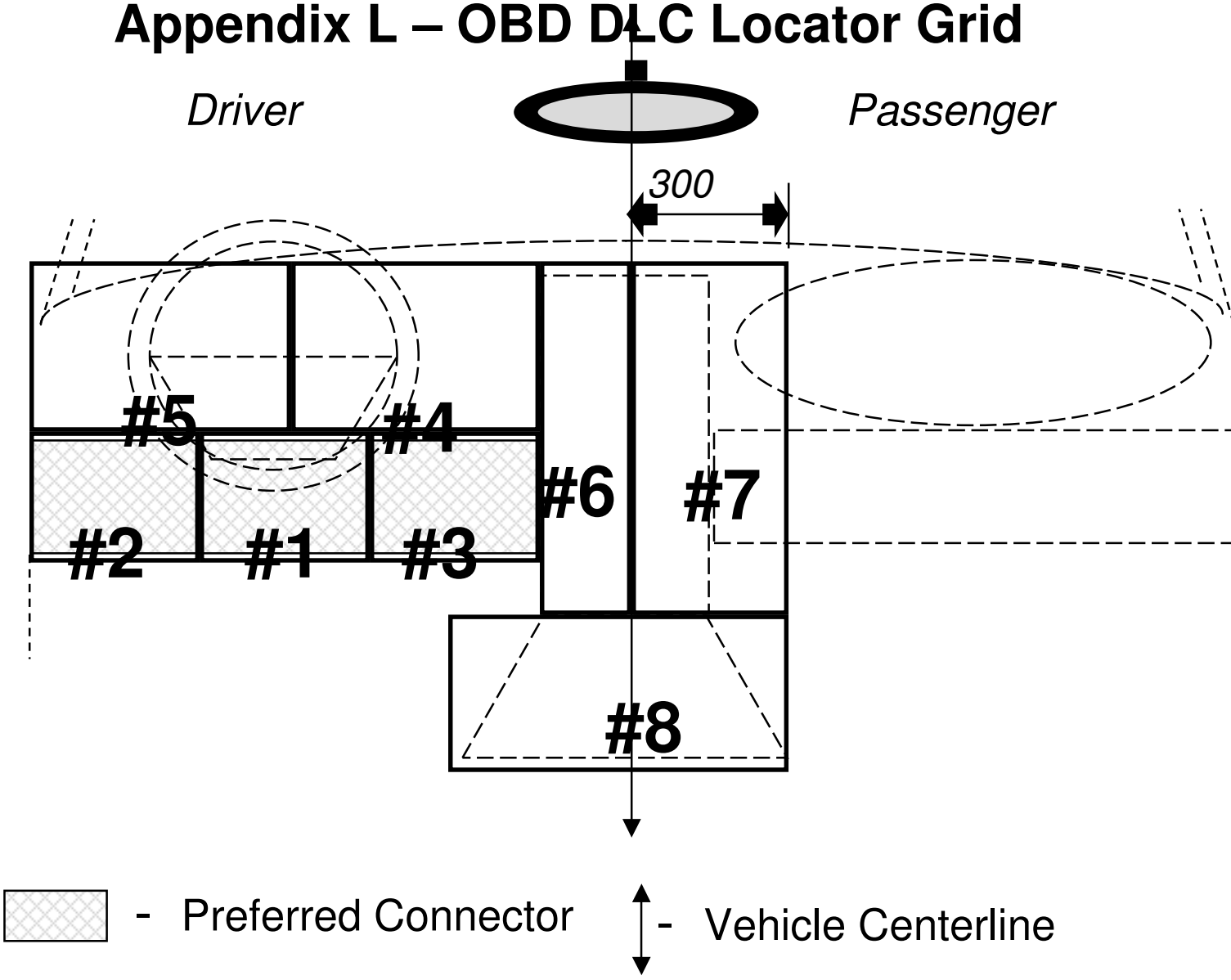
Read the "Failed Vehicle" pamphlet for information on repairs and possible warranty coverage for your vehicle.

VIR PRINT MESSAGE (3){VIRPMF03}

This test was aborted due to code xx*. The inspection was not completed for the reason listed below. Present this report when a new test is performed
* xx indicates ABORT CODE, except ABORT 50

VIR PRINT MESSAGE (4){VIRPMF04}

Appendix L – OBD DLC Locator Grid



Note: Area **#9** is any area not covered by **#1- #8**.

Diagnostic Link Connector (DLC) Mapping Diagram Explanation

The mapping diagram of DLC locations contains a divided instrument panel (IP) with numbered areas. Each numbered area represents specific sections of the IP where manufacturers may have located DLCs. This document briefly clarifies the numbered locations on the mapping diagram. We will use this mapping diagram to catalog manufacturer responses to the recent 208 letter requesting OBD DLC locations for 96MY and future vehicles. Areas 1-3 fall within the preferred DLC location while the remaining areas, 4-8, fall into the allowable DLC location according to EPA requirements. Areas 4-8 require that manufacturers label the vehicle in the preferred location to notify parties of the alternate connector location.

Preferred Location(s)

Location #1: This location represents a DLC on the underside of the Instrument Panel (IP) directly under the steering column (or approximately 150mm left or right of the steering column).

Visualizing the underside of an IP divided into three equal parts from inside the passenger compartment on the driver's side, this represents the center section.

Location #2: This location represents a DLC positioned on the underside of the IP between the steering column and the driver side passenger door. Visualizing the underside of an IP divided into three equal parts from inside the passenger compartment on the driver's side, this represents the left section.

Location #3: This location represents a DLC positioned on the underside of the IP between the steering column and the center console. Visualizing the underside of an IP divided into three equal parts from inside the passenger compartment on the driver side, this represents the right section.

Allowable Location(s)

Location #4: This location represents a DLC positioned on the upper part of the IP between the steering column and the center console (but not on the center console see #6).

Location #5: This location represents a DLC positioned on the upper part of the IP between the steering column and the driver side passenger door.

Location #6: This location represents a DLC positioned on the vertical section of the center console and left of the vehicle centerline.

Location #7: This location represents a DLC positioned on the vertical section of the center console and up to 300mm to the right of the vehicle centerline or on the passenger side of the vehicle.

Location #8: This location represents a DLC positioned on the horizontal section of the center console either left or right of the vehicle centerline. This does not include the horizontal section of the center console that extends into the rear passenger area (see location #9).

Location #9: This location, not shown, represents any DLC positioned in an area other than those mentioned above (in the rear passenger area on the driver side arm rest).

Appendix M – OBD Trouble Codes

Typical OBD codes, as defined by SAE J2012 The list of codes shall be updated with future revisions in conjunction with changes to 40 CFR 86.094-17(h) (3)

(Below is a partial list is for reference)

(1) Any PX1XX Fuel and Air Metering codes.
(2) Any PX2XX Fuel and Air Metering codes.
(3) Any PX3XX Ignition System or Misfire codes.
(4) Any PX4XX Auxiliary Emission Controls codes.
(5) P0500 Vehicle Speed Sensor Malfunction.
(6) P0501 Vehicle Speed Sensor Range/Malfunction.
(7) P0502 Vehicle Speed Sensor Circuit Low Input.
(8) P0503 Vehicle Speed Sensor Intermittent/Erratic/High.
(9) P0505 Idle Control System Malfunction.
(10) P0506 Idle Control System RPM Lower Than Expected.
(11) P0507 Idle Control System RPM Higher Than Expected.
(12) P0510 Closed Throttle Position Switch Malfunction.
(13) P0550 Power Steering Pressure Sensor Circuit Malfunction.
(14) P0551 Power Steering Pressure Sensor Circuit Malfunction.
(15) P0552 Power Steering Pressure Sensor Circuit Low Input.
(16) P0553 Power Steering Pressure Sensor Circuit Intermittent.
(17) P0554 Power Steering Pressure Sensor Circuit Intermittent.
(18) P0560 System Voltage Malfunction.
(19) P0561 System Voltage Unstable.
(20) P0562 System Voltage Low.
(21) P0563 System Voltage High.
(22) Any PX6XX Computer and Output Circuits codes.
(23) P0703 Brake Switch Input Malfunction.
(24) P0705 Transmission Range Sensor Circuit Malfunction (PRNDL Input).
(25) P0706 Transmission Range Sensor Circuit. Range/Performance.
(26) P0707 Transmission Range Sensor Circuit Low Input.
(27) P0708 Transmission Range Sensor Circuit High Input.
(28) P0709 Transmission Range Sensor Circuit Intermittent.
(29) P0719 Torque Converter/Brake Switch ``B'' Circuit Low.
(30) P0720 Output Speed Sensor Circuit Malfunction.
(31) P0721 Output Speed Sensor Circuit Range/Performance.
(32) P0722 Output Speed Sensor Circuit No Signal.
(33) P0723 Output Speed Sensor Circuit Intermittent.
(34) P0724 Torque Converter/Brake Switch ``B'' Circuit High.
(35) P0725 Engine Speed Input Circuit Malfunction.
(36) P0726 Engine Speed Input Circuit Range/Performance.
(37) P0727 Engine Speed Input Circuit No Signal.
(38) P0728 Engine Speed Input Circuit Intermittent.
(39) P0740 Torque Converter Clutch System Malfunction.
(40) P0741 Torque Converter System Performance or Stuck Off.
(41) P0742 Torque Converter Clutch System Stuck On.
(42) P0743 Torque Converter Clutch System Electrical.
(43) P0744 Torque Converter Clutch Circuit Intermittent.

Appendix N – Mobile Tester Application

Section J **Mobile Tester Information** NOTE: INFORMATION IN THIS SECTION MUST MATCH SECTION A OF THE STATION CERTIFICATION APPLICATION. (PLEASE PRINT)	**Dept. Use 0nly** APPLICATION NO. _____

Business Name	
Mailing Address	
Street Address (where a telephone line will be installed.)	
City/State/Zip Code	
Owner Name	
Business Telephone	( ) --

Section K **Mobile Tester Requirements**	READ AND INITIAL EACH REQUIREMENT TO INDICATE AGREEMENT.

1. Applicant understands that the classification of "Fleets" are limited to commercial vehicles, utility services, government services and businesses which are engaged in the sale, rental or leasing of motor vehicles and have a fleet inventory of at least 10 vehicles.	_____ Initials
2. Applicant understands that to be issued a Certificate of Authorization for Mobile Testing, it is required that the home base of the mobile tester be a certified public emission test station open at least 40 hours per week or be a fleet tester performing mobile tests on their	_____ Initials
3. Applicant understands that Georgia's Clean Air Force (GCAF) must inspect and certify the vehicle used to house a mobile GAS.	_____ Initials
4. Applicant agrees to provide the GAS unit and associated test equipment with adequate protection from inclement weather and temperature extremes as detailed in the I/M Manual.	_____ Initials
5. Applicant agrees that, prior to performing any emission inspections in the confines of a fleet building, he or she will ensure that the building has adequate ventilation, which meets all local and state codes.	_____ Initials
6. Applicant agrees to verify that all emission inspections performed at the fleet location**,** shall be for the sole purpose of inspecting the vehicles owned and operated by the fleet owner, and not privately owned vehicles.	_____ Initials
7. Applicant agrees that fleet vehicles shall be tested on the fleet owner's premises, and only vehicles verified as owned by the fleet shall be tested.	_____ Initials
8. Applicant understands a Vehicle Identification Database (VID) connection shall be established and test data uploaded within 72 hours of an official Georgia emission test.	_____ Initials

9. Applicant agrees to provide to Georgia's Clean Air Force proof of insurance for liability coverage for testing on property owned, rented or leased by the fleet, as well as automotive insurance for operating on state highways.	_____ Initials
10. Applicant understands that a telephone line is required for each GAS unit used by the mobile test station. Telephone lines or extensions of the lines may not be shared among multiple GAS units and must be located at a fixed station or at a office location of the company.	_____ Initials
11. Applicant understands that a telephone line for the GAS unit must be operational prior to final mobile station certification, and that final certification shall be performed at the location where the line is installed.	_____ Initials
12. Applicant agrees to allow any GCAF employee or EPD access to the upload or home location of the GAS unit as well as access to location where mobile testing is being performed.	_____ Initials
13. Applicant agrees to submit a proposed testing schedule to GCAF via fax or mail by 2:00 PM on the business day prior to testing. This schedule would identify: the mobile unit scheduled to perform the testing, the fleet company where testing is scheduled, the inspector performing inspections, time, location and estimated number of vehicles to be inspected for each appointment. Applicant understands that GCAF will use these records for scheduling audits. The actual testing must be performed by the unit listed on the schedule and can begin as much as 30 minutes before or after the time listed on the submitted schedule.	_____ Initials
14. Applicant understands that all invoices that are submitted to fleet owners shall identify: vehicle identification numbers, dates, fleet location, numbered invoices and fleet company name. These invoices shall be available for review by GCAF employees or EPD at their request.	_____ Initials
15. Applicant understands that the GCAF Station Certificate of Authorization and Inspector Certificates must be available for inspection at all times.	_____ Initials
16. Applicant undertands that any violation of Mobile Station requirements may be cause for suspension or revocation of the Certificate of Authorization for mobile testing.	_____ Initials

_____ Authorized Signature	_____ Print Company Name
_____ Print Name & Title	_____ Date

Appendix O – ASM Test Standards

NOTE: The DATA in this chart is the same as the Federal ASM2 PDF formatted documents and will be supplied here as a convenience to those reading this document.

The values in Table (a) are parts per million for HC (columns 2-14), percent for CO (columns 15-28), and ppm for NO (columns 29-39). Column 1 contains vehicle test weights.

<Insert ASM2525/5015 cut-point xls files here.>

Appendix P – Specification Development

The notes of the development meetings and conference calls will appear here once final software is approved .